The
Electrical Review

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Straws in the Wind

SEVERAL events have lately been recorded in the electricity supply world which when studied separately may seem to possess little more than local interest, but which if considered collectively may assume some significance.

A week or two ago we reported that private interests had made an offer to purchase the undertaking of the Ayrshire Electricity Board, and that the Ayrshire County Council had decided to discuss the matter. Last week we stated that an offer had been made to the Southend-on-Sea Town Council to take over the electricity and transport departments, and that a special committee had been set up to consider the suggestion.

Since then the Folkestone proceedings, which have been occupying attention for some time past, have assumed special prominence owing to the reported decision of the Electricity Commissioners to decline to approve of the sale of the Folkestone Electricity Supply Company's undertaking (one of the County of London group) to the Folkestone Corporation under the terms of an agreement.

The company, it is stated, was prepared to make reductions in the price of energy which would have been worth £20,000 per annum to consumers, and to allow the Corporation to have two representatives on the directorate, if the right to purchase were not exercised.

These movements, offers, or decisions, as the case may be, can with little danger be associated in our minds with the fact that a situation is developing in which we shall find our way step by step toward an altered arrangement of Britain's electricity supply administration. The capital commitments of local authorities on undertakings which are not essentially part of simple local government have been the subject of close attention from Government and financial authorities, and, as already stated here, a new committee has been appointed to see what can be done to reduce the burden of local indebtedness.

We have no axe to grind—the success of electricity supply, free from parochial handicaps and inefficient, non-continuous, unbusinesslike administration, is what we desire to see. Small local authorities—or those responsible for their electricity systems—are not slow to let it be known that their undertakings are not big enough to carry the cost of staff necessary to develop them in such a way as to give a good service to everybody. Furthermore, they cannot reach out beyond their own borders to rural districts. That something has to be done to fill in the vacant spaces if everybody is to have the chance of obtaining a public supply at reasonable rates is obvious. Those authorities, municipal or otherwise, who are either incapable of meeting requirements or are for constitutional, economic or other reasons indisposed to do so must make way for such needs to be provided for in some other way.

A plan has been prepared by the Labour Party for reorganising the electricity supply industry. We made brief allusion to the proposal last week, and to-day we publish a summary of it, with comments from the pen of Mr. H. M. Sayers, M.I.E.E. While it has to be recognised that the report is only a draft intended for discussion at an October conference, it is prefectly right and proper for the industry itself to welcome and carefully to consider suggestive ideas originating in any quarter.

Brighter Farming

ALTHOUGH we cannot deceive ourselves into believing that in a year or two agriculturists will be clamouring for electricity at any cost and that the farming industry will be revolutionised, we are convinced that there is a definite spirit of inquiry into this "new" agency abroad amongst farmers. It is wise, therefore, for electrical people to stimulate this spirit and to endeavour to convince the inquirers by facts presented in a practical but palatable manner. This is the idea behind the E.D.A.'s latest propaganda effort, "Electricity and the Farm," reviewed in this issue, which represents a welcome departure from the Association's usual style, which was threatening to become rather stereotyped. It is brightly written, has

an attractive coloured cover, and tells its story succintly, with effective illustrations. We think that it should enjoy a considerable amount of success among farmers with subsequent results of mutual benefit to them and to the electrical industry.

Heavy-current Works Distribution

WHATEVER else may be said about the unusual cabling scheme at the Dagenham works of the Ford Motor Co., Ltd., described this week, the heavy conduiting certainly makes a very neat job and a striking contrast to bracketed and sagging cables. It is hardly possible for us to estimate the monetary value of appearance to any concern, but it is fairly obvious that, apart from this consideration, the scheme is not an economic one. One advantage claimed for the scheme is that any one cable could be withdrawn in the event of a trouble. We imagine that a 0.75 sq. in. cable would require a "hefty" pull to remove it from a nest of three. Not the least deserving of congratulation among those concerned with this exceptional piece of work are the contractors, who had to design special equipment for its execution.

Austrian Depression

HOW unfavourable was the position of the Austrian electrical industry last year is shown by the fact that only two dividends are reported. A correspondent says that this follows the stoppage of public expenditure upon hydro-electric works and the electrification of railways, while both ordinary home and export trade have almost come to a standstill. The only "high-tension" concern to pay a dividend was the Brown Boveri Company—6 per cent., against 12 per cent. for 1930, this comparatively favourable result being ascribed to profits arising from the Jalomita hydro-electric works established in Rumania. Of the "low-tension" producers, who likewise suffered from lack of orders, the Berliner Telephone Company was able to pay only 5 per cent., as compared with 7½ per cent. for 1930.

The German Cable Industry

THE German cable manufacturing industry is feeling the effects of reduced home demands, due to financial and other restrictions. The market generally is controlled by two syndicates—the "high-tension" and the "low-tension" concerns, respectively; the low-tension branch has been the worse sufferer. The export trade also shows a monthly decline—even deliveries to Russia have fallen considerably since the end of last year. The export figures for several recent months were:—January, 2,500 tons; February, 1,700 tons; April, 1,600 tons; and May, 1,480 tons.

A Grid Reflection

ONE of the earliest reflections of the operations of the Central Electricity Board is to be seen in the report of the engineer (Mr. W. N. C. Clinch) on the working of the Brighton electricity undertaking for the year ended March 31st last. Much has been said concerning the enormous progress of the undertaking; its sales have increased in two years by nearly 100 per cent. But most of that increase was supplied to the grid. We gather that Southwick is now definitely to be a grid unit, and the announcement that it has actually operated in parallel with the London power stations will be received by many supply engineers with considerable interest.

Domestic and Power Development

A TRUER indication of electrical development within the Brighton area is the increase of over 2¼ million kWh above the 21 million kWh sold during the previous year as "private supplies," this item apparently including both domestic and power supplies. Generally, indications of the respective and relative advances in the domestic and industrial fields are of value to the industry, and should be given in annual reports.

Suggestions Invited

WE shall, we hope, not be unduly optimistic when we guess that practically the whole of the readers of the ELECTRICAL REVIEW are consumers of electricity in their households. This solid body of satisfied users denotes a vast accumulation of well-informed and practical experience of electrical apparatus. Why should so many lights be hidden under bushels? "Protonius," in our Correspondence pages to-day, advances a useful suggestion, and we wish to support it heartily. We invite our readers to forward to us particulars of any ideas that have occurred to them regarding any adaptations, improvements or new applications of electrical contrivances. Our correspondent mentions fans and cookers, but suggestions covering electrical contrivances of any other kind, whether in the domestic field or out of it, may form a very interesting and valuable study.

Electric Shocks

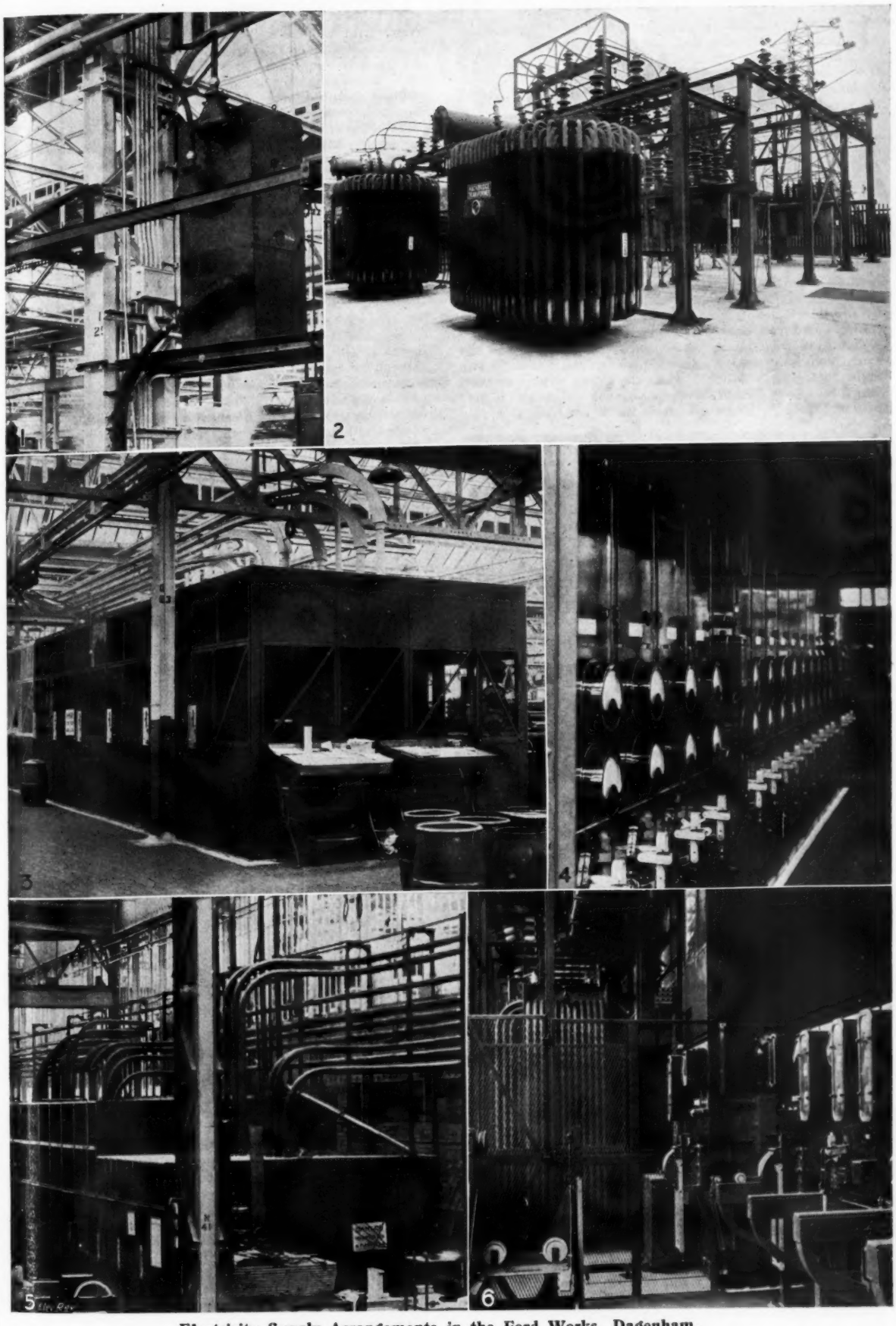
THE correspondence now appearing in our pages regarding electric shock effects reminds us of the very valuable research work done in this connection some years ago by Dr. Margaret Cleaves in the United States. Her international investigations were conducted with painstaking zeal, and some of the papers or reports read by her on the other side of the Atlantic were published in the ELECTRICAL REVIEW when such subjects as "The Current that Kills" and "The Current that Cures" were more general here than they are to-day. Incidentally, we recall that Dr. Cleaves was a close student of this journal in search of reports of electric shock accidents. No doubt there are electro-medical specialists studying this subject and tabulating the results of inquiries to-day. The Home Office annual reports on electrical accidents constitute a useful record regarding factory cases. The "Suggestions for Dealing with Apparent Death from Electric Shock" published by the ELECTRICAL REVIEW have been, for many years past, posted up in thousands of power and sub-stations, collieries, factories, and other such places in this and other countries. They have been the means of saving many lives when prompt and persistent resuscitation efforts have been made along the lines indicated. The experiences of those thus successfully operated upon would be interesting if they could be recalled and recorded, but there are others with similar experiences of a less serious nature who we hope may be willing to contribute to this interesting symposium.

Thunderstorms

LONDON felt the full force of last Monday's thunderstorm, and at least one death and more or less serious injury to a number of people resulted from lightning discharges. The storm once again reminded us that the study of the incidence and effect of lightning does not seem to be so much to the fore these days. There are still many phases of the subject on which more information would be useful. Whether the British Isles are subject to more thundery days in summer than in winter is still undecided. Casual personal observation, in London at any rate, seems to indicate maximum storm occurrence in July, with smaller peaks early in May and September. Such statistical data as have been collected so far, however, are barely sufficient to make it possible to determine where and when disturbances are most likely to occur with prevailing types of weather.

Bad Sportsmanship

SUCCESSFUL tests of pocket radio receivers for the police were carried out at Brighton last week. One of the events was the broadcasting of the number of a car supposed to be wanted, and we are told that within ten seconds of the message being sent out an officer had stopped the car. Then a real opportunity occurred. It was reported that a car had actually been stolen. The number and description of the vehicle was sent out, but the thieves failed to take the road upon which the tests were being made. It is this unhelpful attitude towards scientific experiment that makes car thieves so unpopular.



Electricity Supply Arrangements in the Ford Works, Dagenham.

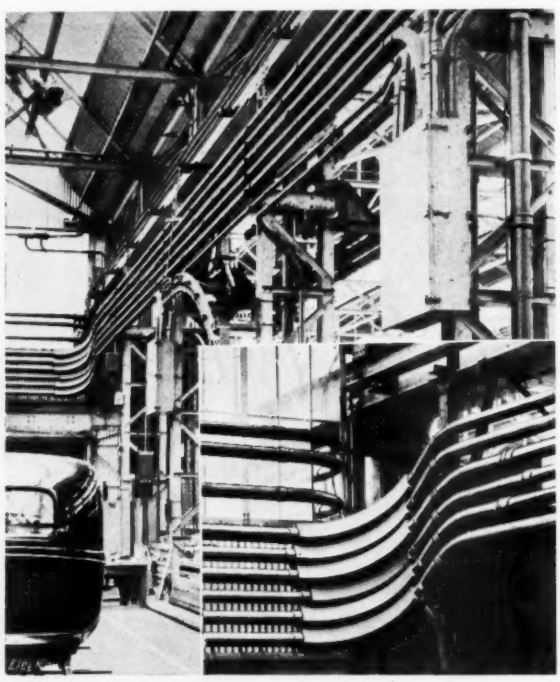
1. 11,000-V ring-main cubicle on elevated platform; 2. Outdoor equipment at No. 1 Estate sub-station; 3. One of the lighting sub-stations, showing heavy conduit above; 4. L.p. switchboard in sub-station shown in illustration No. 3; 5. Cable pipes on special supports from one of the main sub-stations; 6. Power transformer, earthing reactor and h.p. switchgear in a main sub-station.

Unique Works Distribution

THE works distribution scheme at the new large factory of the Ford Motor Co., Ltd., at Dagenham, Essex, is unusual and unique in many respects, chief among which is the use of heavy v.i.r. cables in very heavy conduit. Much of the latter had to be manufactured for the job, and involved the use of specially made tools for its installation.

Pending the completion of the company's own power station a supply is being taken from the County of London Electric Supply Co., Ltd., at 33,000 V by overhead mains to the No. 1 estate outdoor sub-station. At this "sub" there are two 6,000- and one 3,000-kVA Hackbridge transformers, 33 to 11 kV, with 2½ and 5 per cent. ± off-load changing. One of the larger transformers and the small one are permanently coupled together as a 9,000-kVA unit, without any interconnecting switchgear. On the 33-kV side there are Reyrolle switches with hand-operated isolators and a bus-bar coupler. Metropolitan-Vickers switchgear controls the 11-kV side from an indoor switch house, and the 33- and 11-kV sides are electrically interlocked. The switch house also accommodates the control board for the 33-kV equipment.

This sub-station is about a mile from the factory, and the connection is by two 0.3-sq. in. underground cables to two main factory sub-stations, with an indoor interconnection which completes the ring main outside the station and is part of a second 11-kV ring main inside the works. The first ring



Conduit and distribution boards in a corner of the foundry building; inset, a "close-up" of special corner bends

is protected by the B.T.-H. self-compensated pilot-wire system. The cables from the outdoor sub-station to the factory pass over the L.M.S. Railway in pipes and under the Dagenham Breach bridge on hangers. From the outdoor sub-station there are several other feeds, including one to each of Briggs Bodies, Ltd., and Kelsey Heyes Wheels Corporation, and one to a small sub-station at the factory water tower. The latter is equipped with a 500-kVA 11-kV/400-V Crompton power transformer, a 150-kVA Hackbridge transformer for lighting, and B.T.-H. switchgear.

Interior Distribution

The factory proper, excluding the foundry section, is in effect one room about 1,000 ft. sq. in area, and the whole of the installation hereafter described is in this "shop." The very heavy current work, both h.p. and l.p., and the sub-station buildings (rooms within a room) render the whole scheme comparable with some public supply sectional schemes.

On the indoor ring main, in addition to the main sub-stations which serve for both power and lighting, there are two lighting and two heat-treatment sub-stations as well as a rotary-convertor "sub." In each of the two main "subs" there are three 2,000-kVA single-phase 11-kV to 400-V power transformers connected in delta, with neutral earthing compensators, and three 150-kVA single-phase 11-kV to 230/115-V lighting transformers and the necessary incoming and outgoing h.p. switchgear, as well as the 400-V 3-phase power feeder panels and the 230-V single-phase 3-wire lighting panels. The lighting sub-stations are of 450- and 900-kVA capacity, respectively, with 230/115-V 3-wire distribution. The heat-treatment stations are of 1,000 and 2,000-kVA capacity respectively, and each is equipped with three single-phase 11-kV to 200-V transformers connected in delta, with the necessary earthing compensators. Heavy-current (1,200 A) panels are employed for the outgoing feeders in these "subs."

The 500-kW rotary-convertor sub-station is employed in conjunction with the works engine-testing equipment. From No. 3 sub-station (lighting) duplicate feeders afford 11-kV supplies to the main office sub-station which, besides the office lighting and power, serves the all-electric kitchen for the "cafeteria." In addition to three 150-kVA transformers and their switchgear there is in this sub-station the main switch-fuseboard for controlling all the distribution boards throughout the office installation. This is of unit construction and was supplied by Cantie Switches, Ltd.

The general construction of the sub-stations is such that the single-phase transformers are all contained in separate expanded-metal cubicles, with the busbars above the transformers and the isolating links between the busbars and transformers. The l.p. connections for the transformers are taken through an isolating switch cubicle to the low-pressure busbars above the corresponding cubicles. The high-pressure switchgear controlling the ring-main sections and the transformers is arranged in the centre of the sub-station, and the power and lighting transformers and cubicles are at either end. The combined power and lighting and separate lighting sub-stations were supplied wholly (housing and all equipment) by the British Thomson-Houston Co., Ltd., and the heat-treatment "subs" similarly by Crompton Parkinson, Ltd. All the 11-kV distribution in the factory is effected by 0.3 sq. in. 3-core p.i. l.c. cable in 5-in. conduit.

Large Diameter Conduits

The l.p. power supply from the "subs" to the main distribution boxes mounted on the building stanchions is conveyed by three 0.75-sq. in. cables in 5-in. conduit. The main power boxes are mostly 8-way 300-A equipments by the Artic Fuse and Electrical Manufacturing Co., Ltd. The sub-distribution boxes are 6-way 60-A equipments supplied by the General Electric Co., Ltd., and are fed from the main power boxes by three 0.15-sq. in. v.i.r. cables in 3-in. conduits. The conduits to the distribution boards are all carried overhead, and in several instances special hanging brackets are used.

From the final power "sub" distribution boards v.i.r. cables in conduit are taken to the machines, &c., under the wood floor blocks. All the lighting mains comprise three cables—two outers and a neutral of smaller section—for the 230/115-V distribution. These mains are either two 0.85 sq. in. and one 0.3 sq. in. v.i.r. cables in 5-in. conduit or two 0.6 sq. in. and one 0.3 sq. in. similar cables in 4½-in. conduit. The main lighting boards are again of Artic manufacture and vary in size with four 4 to 9 ways of 200 to 250 A capacity per way. The sub-distribution boards (G.E.C.) vary in size with from 6 to 12 ways, 15 to 30 A per way. The mains from the main to the "sub" boards comprise two 0.2-sq. in. and one 0.1-sq. in. v.i.r. cables in 3-in. conduit, or two 0.1-sq. in. and one 0.075-sq. in. similar cables in 3-in. conduit.

Lighting and Other Services

All the lighting distribution from the final "sub" boards is carried out at 115 V (outer to neutral) and the neutral is earthed in every case. All the lighting fittings are of the industrial type supplied by Benjamin Electric, Ltd., and in order to obtain correct spacing the fittings and conduits are carried from suspension wires across the building between the roof trusses. The lighting generally is from 15 to 18 foot-candles at the working plane.

All the roof lights and windows are electrically operated; there are 82 motors for the windows and 106 roof-light motors, each 1 h.p., 3-phase, 400 V. They are separately controlled by push-button operated contactors; one roof-light motor operates a total weight of 11 tons of windows. The whole factory is ventilated and heated by unit heaters (steam) mounted on the roof trusses. The 384 heaters each have a ¼-h.p. motor-driven fan, and they are controlled by push-button contactors in groups of from 11 to 16. The contractors for the complete power and lighting system were Messrs. B. French, Ltd. The window operating gear and the ventilation and heating equipment were supplied by Hopes Heating & Lighting Co., Ltd. All the outgoing l.p. power feeders are metered for costing purposes, and the lighting from each sub-station is metered in bulk. The factory cranes are all d.c., and the conductor rails are all tied at each end, each set of rails being protected by 300-A Whipp & Bourne circuit breakers at each end and inside the tie. The crane supply is temporarily received from a motor-generator set. The whole of the h.p. cables were supplied and installed by Callender's Cable & Construction Co., Ltd.

An All-electric Hostel

Space heating with "outside-temperature" control

RUTLAND Hall, the new students' hostel of Loughborough College, which is nearing completion and stands on the College playing fields, facing Charnwood Forest, is truly all-electric, the modern method serving in each case for space heating, water heating, cooking, lighting and time keeping. The present building, one of a projected group of three, has accommodation for 90 students, with a bed-sitting-room for each, and with a spacious dining-room, common-room, library, three special studies for quiet reading, and lounge, in addition to the kitchen and the apartments of the matron and house master. The total installed loading for all services is approximately 400 kW.

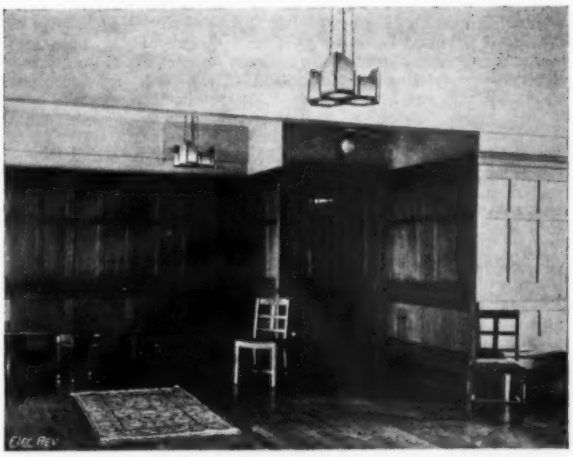
Undoubtedly the outstanding feature is the space heating installation, for which electricity won the day, when it was considered with a scheme submitted for a coke-fired central hot-water system, on both initial and running costs. Tubular heating is employed throughout, with a standard loading of 60 W per ft., the tubes being of the "Vulcan" make (Credenda Conduits Co., Ltd.). The heating alone represents a considerable proportion of the load—about 260 kW.

This is believed to be the first heating installation of its kind in this country to have an overall automatic control according to the temperature of the atmosphere outside the building.

The Control System

The installation is divided into two main sections, one serving for base heating in the students' private rooms and also for the general heating in the remainder of the building, and the other for boost heating in the students' rooms. In a protected position on the roof there are two thermostats, each controlling one of the main sections.

Through a relay each of these thermostats operates a motor incorporated in the corresponding main oil circuit-breaker, and this motor drives through gearing a spindle to which is fixed a crank which raises or lowers the member carrying the moving contacts. Two sets of contacts on the spindle, in conjunction with wiper contacts, make the necessary connection between the motor and the relay unit. Secondary and "interior" thermostatic control is also employed for the base and general heating. The students' bedrooms are controlled in groups, and practically all the other rooms are controlled separately, by one or two thermostats.



Corner of the lounge showing lighting fittings and heating tubes

Some of the kitchen equipment; double-oven range left, toaster right

Each student has control of the boost heating in his own room, apart from the main "exterior temperature" control. The boost circuit in each room is governed by a dual-coil contactor, one coil of which, operated by a push-button, places the contactor "on." The other coil is used to break the circuit, and is connected, in common with all the corresponding coils in all the bedrooms, to a timing relay unit with a small synchronous motor in the control room. This motor operates all the "off" coils every hour, so that it is impossible for the boost heat in any one room to remain on for longer than that period continuously.

Although the temperature limits, loadings, and provisions for air changes in different rooms and sections of the building vary, as a whole the installation is designed to maintain an internal temperature of 60 deg. F., with an external temperature of 32 deg. F., and an average of 2½ changes of air every hour. The building is a three-storey one, and, of course, the loadings on the top floor are considerably increased because of the additional outward radiation due to the roof.

A bedroom on the middle floor has installed a total of 21 ft. of tube. Of this 11 ft. is for the base heat and 10 ft. for the boost. One length on one of the interior walls by the door and one length on the exterior wall under the window serve for the base heating, and one length on the other interior wall by the door and a second length on the exterior wall provide for the boost heat.

For a similar room on the top floor the total length of tubes is 29 ft.—14 ft. on base and 15 ft. on boost heating—with three lengths on the exterior wall and a single length on each of the interior walls by the door. Each student's room measures about 12 ft. by 10 ft. by 9 ft. high.

The dining-room (top floor) measures about 60 ft. by 30 ft. by 20 ft. high, and the total loading, all on one thermostat, is about 14 kW. The tubes are arranged in two- and three-tier banks round the room, with increased loading on the exterior wall. The common-room on the ground floor which is also a very spacious apartment has approximately 6 kW of tubes wholly controlled by one thermostat. There is also provision for two 3-kW radiant fires to supplement the heating of this room.

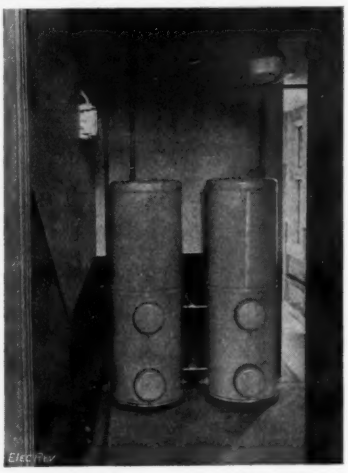
The main entrance hall, which is bordered on one side by the main doors, and has four lead-offs to passages and stairs, has 2.9 kW of heaters installed in it. In each of the numerous bathrooms there is a tube, along one wall about 3 ft. up from the floor, with a perforated nickel-plated shield, serving for space heating and towel drying. The inside thermostats were supplied by Messrs. Barker, Young & Co., Ltd., and the outside thermostats and the control relays by Messrs. Nathan & Allen, Ltd.

Heating equipment and main and emergency lights in the dining room

Hot-water Services

For the hot-water services there are four pairs of 60-gal. cylindrical storage tanks in convenient corners at corridor junctions, serving groups of bathrooms and sprays separately, in addition to two similar 80-gal. tanks for general hot-water supplies to the bedrooms, &c. There are also numerous small

water heaters for local supplies supplied by Messrs. A. R. Smith & Sons, Leicester. Each 60-gal. tank has two banks of three 1-kW "Chromalox" blade type immersion heaters, one set fixed at the bottom of the tank and the other about halfway up. Each bank is separately automatically controlled by a "Satchwell" thermostat. These heaters were assembled and supplied as a whole by the main contractors for the complete installation, Messrs. A. R. Smith & Sons, Leicester, whose technical manager, Mr. George Jackson, suggested the placing of the thermostats outside the building.



Water heaters in a corridor; note tubes and lighting

The main kitchen equipment was all made by the General Electric Co., Ltd., and it includes a double-oven range (total loading 30.6 kW) with six 2.5-kW and two 1.2-kW boiling plates and a large grill; a 4.2-kW toaster with a plate-warming compartment above the grilling element cover; one two-pan fish-fryer (7 kW) and a similar single-pan unit; a large warming cupboard and a hot plate measuring about 10 ft. by 4 ft. by 3 ft. high, loaded at 6.4 kW; and a 4-kW steaming oven with ball-valve water control. All the equipments are separately controlled by "Botrade" ironclad switch fuses, in which have been incorporated pilot lamps and ruby glasses. The kitchen cooking equipment is balanced over the three phases as a whole.

In a recess outside the kitchen is a 75-cu.-ft. refrigerator, which is divided into two main compartments, as well as a freezing chamber, so that "wet" and "dry" cold may be provided for different kinds of food. The cabinet is by Messrs. Smith & Co. and the unit by the Asco-Servel Co., Manchester.

Simplicity and efficiency is generally the keynote throughout for the lighting installation, totally enclosed G.E.C. pendant units being mostly employed. As an example, in the common room an intensity of six foot-candles is obtained from eight "Walton" fittings, each equipped with a 150-W lamp. Some excellent examples of "effect" lighting may be seen in such places as the lounge, &c., where there are various tinted panel-type wall and ceiling units.

Safety lights in the corridors and important rooms (totally enclosed globe bracket units with 25-W lamps) are supplied at 100 V from a "Nife" battery fed by a "Davenset" trickle charger. The main lighting circuit is time controlled, and the emergency lighting is automatically switched on whenever the main lighting is "off" for any reason. Floodlighting is to be adopted for the building exterior, the surrounding drives, and the entrance gates. The control relays for the lighting were supplied by Messrs. Nathan & Allen, Ltd. Synchronous clocks are to be employed throughout the building, and an electric syren is also to be installed.

The main switch and fuse-gear for the whole installation is of the "SSS" type, supplied by Simplex Conduits, Ltd. Except for the cooking equipment, the whole scheme is in three sections, one on each phase, each section being served by ironclad sub-distribution apparatus supplied by the Midland Electric Manufacturing Co., Ltd., in each case. Individual supply is 230 V phase to neutral. Duplicate e.h.p. supplies from the Loughborough electricity undertaking are transformed from 6,600 V to 400 V three-phase in a kiosk in the grounds.

The installation was designed to the specification of Mr. J. Driver, M.I.E.E., head of the Electrical Engineering Department of the College. Capt. E. G. Fowler, F.R.I.B.A., architect to the Leicestershire County Council, was responsible for the design of the hall, entrance gates, and layout. Electricity is supplied at ½d. per kWh.

Indian Electrical Notes

(FROM OUR INDIAN CORRESPONDENT)

AS some criticism of the financial prospects of the Ganges grid scheme for the production of hydro-electric power from the various falls of the Ganges Canal has appeared in the Press, the Government of the United Provinces has issued a communique stating the present position of the scheme and details of its financial prospects.

The approximate expenditure on the grid proper up to the end of the year 1931-32 was Rs.124 lakhs. Four hydro-power stations have been provided, from which 5,500 h.p. is always available, while the total anticipated cost of the first stage of the scheme is Rs.142 lakhs. The demand for power is steadily increasing, and in the year 1931-32 amounted to 4,300 h.p., as against 1,500 h.p. in the previous year.

Revenue and Expenditure

The year 1932-33 will be the first complete year of working, and the gross revenue is estimated at Rs.10 lakhs, with a deficit of Rs.2.4 lakhs. In 1933-34 the revenue is estimated at Rs.15 lakhs, and, after meeting expenditure, there will be a net contribution of Rs.1 lakh to provincial revenues. In 1934-35 additional hydro-electric power will be available, and a net profit of about Rs.2½ lakhs is estimated. The scheme will afford cheap power for irrigation and agriculture over 10,000 sq. miles of country having at present no other source of power than small oil engines.

State Broadcasting Services

The operation of the Bombay and Calcutta broadcasting stations for the year ended March, 1931, shows a net loss of Rs.165,000, the station directors pointing out that this loss is less than anticipated. The number of licences has increased, but much loss of revenue is due to wireless pirates, especially in the "moffusil," and to the non-imposition of customs duty on articles which are really component wireless parts. When the Government took over the broadcasting services, the machinery and apparatus at the central room and transmitter had been in use for over two and a half years, and it was therefore found necessary to replace a large part of the equipment.

Endeavours are being made to popularise sponsored programmes, but so far little progress has been made. Similarly, reception of short-wave transmissions from abroad has not on the whole proved successful, chiefly due to the fact that proper apparatus has not been available.

The Madras-Bombay Telephone Line

The construction of the trunk telephone line between Bombay and Madras is now almost complete, and it is understood that the charge for a three-minutes' talk will be Rs. 7. With the completion of this line South India will, for the first time, be connected with all parts of India; the telephone line has been constructed by the conversion of two telegraph lines into telephone lines. Further developments are also likely to take place. It is proposed to connect the states of Mysore and Hyderabad with the trunk line. Meanwhile the possibilities of a trunk telephone service between important towns in South India has been brought to the notice of the Government, and a beginning is likely to be made as soon as central finances improve.

India-England Telephony

Good progress is reported in connection with the scheme to inaugurate a wireless-telephone system between India and England, and erection work at the transmitter site at Kirkee, near Poona, is nearing completion. It is understood that the system will be in operation by the end of the year. The work is being done by the Indian Radio and Cable Communications Co., Ltd., which now controls all foreign traffic emanating from India. The total cost of the present construction will be about £30,000.

Madras Electricity Extensions

The Pykara and the Periyar projects are the two important hydro-electric schemes in the Madras Presidency. So far as the Periyar project is concerned, it is understood that the plans and estimates are now complete and have been submitted to the Government of Madras, while at the same time as a preliminary to the development of the project, generating plants driven by oil engines will be installed at Virudhunagar, Dindigal and Palni to supply electricity to these towns. Power from the Pykara project is to be supplied to Trichinopoly.

Electrical Imports

Electrical machinery imported into India during the year 1931-32 was valued at Rs.216 lakhs as against Rs.238 lakhs in the previous year. Control and switchgear declined from Rs.45 lakhs to Rs.35 lakhs, motors from Rs.44 lakhs to Rs.29 lakhs, and transformers from Rs.16 lakhs to Rs.11 lakhs, but generators improved from Rs.41 lakhs to Rs.46 lakhs, and turbo-generating sets from Rs.3 lakhs to Rs.4½ lakhs.

Out of the total of Rs.216 lakhs, imports worth Rs.150 lakhs were imported from the United Kingdom, as against Rs.181 lakhs in the previous year, Rs.15 lakhs worth came from Germany, and Rs.36 lakhs worth from the United States.

Electrical Instruments

Imports of electrical instruments and apparatus were valued at Rs.222 lakhs, as against Rs.310 lakhs in the previous year, the United Kingdom's share falling from Rs.174 lakhs to Rs.115 lakhs. Germany supplied goods to the value of Rs.32 lakhs, as against Rs.42 lakhs, the Netherlands Rs.13 lakhs (Rs.15 lakhs), Italy Rs.5 lakhs (Rs.8 lakhs), and Japan Rs.5 lakhs (Rs.7 lakhs), and the United States Rs.30 lakhs (Rs.43 lakhs). Imports from all other countries rose slightly to Rs.30 lakhs.

Among the principal imports, electric fans and parts declined from Rs. 26 lakhs to Rs.19 lakhs (out of which Rs.10 lakhs worth came from the United Kingdom), electric wires and cables fell from Rs.105 lakhs to Rs.60 lakhs, and electric lamps rose from Rs.33 lakhs to Rs.35 lakhs. Accumulators declined from Rs.18 lakhs to Rs.8 lakhs, lighting accessories and fittings from Rs.9 lakhs to Rs.7 lakhs, and unenumerated goods from Rs.56 lakhs to Rs.40 lakhs.

Contract Tariffs for Domestic Water Heaters

THE contract tariff consisting of a fixed charge per unit time, based on the assumption of definite service rendered, has well-known advantages and limitations, Commercially it has the merit of simplicity, being easily understood and avoiding the cost of meters and billing. These advantages are specially attractive in the case of small lighting consumers. At the other extreme, the method is often conveniently applicable to bulk-supply contracts. When supply to miscellaneous domestic or industrial equipment is concerned, the general application of the plain contract tariff is hardly feasible. But it is the underlying principle of a whole series of tariffs, including those based on rateable value, floor area, room volume, and so on.

The increasing use of long-hour domestic appliances, such as water heaters and refrigerators, suggests that a simple contract tariff may be advantageously applicable to a part of the consumer's supply. For example, as pointed out by Mr. E. Coignet in a recent issue of *Revue Générale de l'Electricité*, the cost of metering the consumption of domestic water heaters of the type used for sink service is a serious handicap to the general introduction of these appliances, which are otherwise attractive to consumers and undoubtedly useful to the supply authority.

Expensive Auxiliaries

According to Mr. Coignet the cost of a 6½-gallon heater is about £8 6s. (at 90 fr.=£1), and the cost of an 11-gallon heater about £10, while the cost of a special meter and time switch may be about £5 17s., which is obviously disproportionate to the cost of the heater itself. The energy consumed is about 1,060 kWh per annum for the supply of 6½ gallons of water per day at 80 deg. C. (176 deg. F.), or 1,580 kWh per annum for 11 gallons a day. At a price of from 0.66d. to 1.07d. per kWh, the annual cost of energy consumed in the two cases will range from about £2 19s. to £4 14s. for the 6½-gallon heater, and from about £4 8s. to £7 for the 11-gallon heater, while the rental of the meter and time switch may amount to from 13s. to £1 per annum, representing an increase of from 15 to 23 per cent. on the cost of service in an average case.

The handicap apparent from these figures may be eliminated by installing the water heater without a meter and making a fixed charge for service based on the assumption that it is continuously in circuit. By appropriately lagging the tank there is no difficulty in maintaining a high thermal efficiency, even in the case of the small heater, and from the generating station standpoint it is preferable to have these heaters continuously in service at n kW rather than at $3n$ kW, as would be necessary if the same heating were to be effected in eight hours instead of twenty-four.

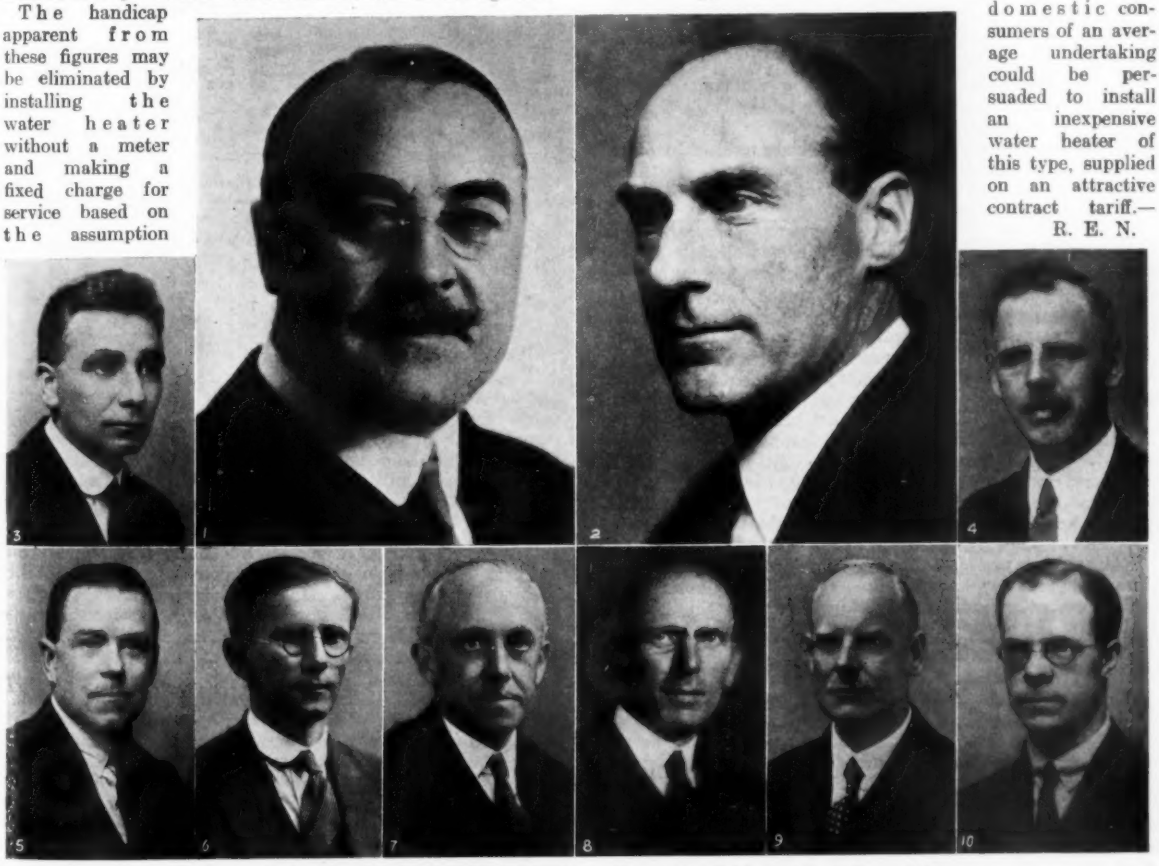
Normally, the maximum temperature reached by the water is 75-80 deg. C. (167-176 deg. F.), but if the consumer should not require all the hot water available during any particular 24-hour period, the temperature of the water can rise to 90-95 deg. C. (194-203 deg. F.) before the thermostat opens the circuit. The consumer has thus no difficulty in obtaining full value for his fixed payment. If the thermostat should fail to act for any reason and the water is brought to boiling point, the steam blows off through a relief pipe.

Supplementary Heating

One contingency remains to be covered, *viz.*, that the consumer may need more than his regular supply of hot water on some occasions, or wish for it at a higher temperature than 80 deg. C. (176 deg. F.). To meet this case, the tank may be provided with a supplementary heating element connected in series with the meter used for the consumer's lighting or other supply. The additional energy consumed by the supplementary element is paid for at the meter rate; it will not result in any objection so long as the supplementary consumption is small, while it will induce the consumer to install a larger heater if he frequently desires more or hotter water.

With this arrangement the tank contains one heating element continuously in circuit, except when it is cut out by the thermostat, this element being rated at, say, 120 W for a 6½-gallon tank, 180 W for an 11-gallon tank, and 360 W for a 22-gallon tank; also, a supplementary element rated at 430 W for the 6½- or 11-gallon tank and at 860 W for the 22-gallon tank. The 430-W element can be used if the consumer has a 5-A meter, and the 860-W element if a 10-A meter is in use.

It is suggested that from 30 to 40 per cent. of the domestic consumers of an average undertaking could be persuaded to install an inexpensive water heater of this type, supplied on an attractive contract tariff.—R. E. N.



Some Driving Forces in the Industry: Everett, Edgcumbe & Co., Ltd.

1, Mr. P. Hamilton, joint managing director (*Vandyk*); 2, Lt.-Col. K. Edgcumbe, chairman and joint managing director (*Elliott & Fry*); 3, Mr. F. Ockenden, head of the Research Department; 4, Mr. A. Drew, general sales manager; 5, Mr. J. McManus, head of the Testing Department; 6, Mr. G. Godfrey, head of the Drawing Office; 7, Mr. A. Plumpton, works sales engineer; 8, Mr. C. Saw, sales engineer (*Elliott & Fry*); 9, Mr. F. Myers, works manager; 10, Mr. R. Everett, designs engineer. (Photographs Nos. 3 to 7, 9 and 10 by *Photographia*, Golders Green.)

Electricity Supply Investments. By Our Financial Correspondent

The present position and future developments

THE marked success of the Government's Conversion offer to holders of 5 per cent. War Loan has had the effect of bringing about substantial capital appreciation in the stocks and shares of all companies whose securities are favourably considered from the investment standpoint. When the Conversion scheme was launched at the beginning of July the first and automatic result was to put up the prices of British Government securities other than the War Loan by between three and five points, the assumption being that a good many holders of the 5 per cent. War Loan would elect to take the cash, which they were offered for their stock, in order to employ it in some other and longer-dated security from which a higher yield would be obtainable.

In view of the rises in quotations just mentioned, the difficulty of transferring into other security of stability equal to that of the War Loan became very pronounced. Patriotism and personal interest combined to induce the greater number of proprietors to make the change-over to the new stock.

The reinvestment has been of a wide character. Confined at first to the purely gilt-edged and fixed-interest securities, it spread into ordinary shares of the best-class industrial undertakings, amongst which it was inevitable, of course, that electricity supply companies' shares should receive early attention. The demand expanded rapidly, and, in accordance with the conventional supply and demand rules, prices went ahead.

The Effect upon London Supply Companies' Shares

Less than six months ago the ordinary shares of London electricity supply companies could be obtained at about 28s., offering, that is to say, a yield of 5 per cent. on the money, taking as the basis of calculation the 7 per cent. standard rate of dividend. To-day, however, the prices of the London electricity shares, as our lists indicate, are quoted at an average level of 32s., the rise of 4s. bringing about a corresponding diminution in the yield offered by investment in the shares, which now comes to £4 7s. 6d. per cent. on the money. The claims of the industry to investment attention have been, it may be stated, fully recognised, but a good many people who bought shares seem, now, to be rather perplexed at the position which the companies occupy. The investors have been reading a good deal about the powers of the Electricity Commissioners and the functions of the various electricity authorities, with the result that, so far from being illuminated by their study, they have become bemused by a fog of uncertainty, and are to-day asking their Stock Exchange brokers to give them some idea of what the real position is.

As anyone who has attempted to elucidate technical matters is well aware, it is not an easy thing to paraphrase official and legal language in such manner as will render it comprehensible to the man-in-the-street.

In the case of the London electricity supply companies the position is tolerably clear, however. Stripped of abstruse and technical language, it may be recalled that the London supply companies, with a few exceptions, originally received concessions that ran out at the end of 1931. These concessions, or "lives," were renewed by an Act of Parliament, passed seven years ago, by which their tenure was extended to 1971. In that year the group of London companies will be taken over by the London and Home Counties Joint Electricity Authority.

To the majority of investors it may be, perhaps, a matter of little moment as to what will happen so far ahead as that. Nevertheless, it is natural that investors should look ahead in the endeavour to form some idea of what will happen at the time the companies become purchasable under the 1925 Act just mentioned. At present this is impossible to say. Forty years hence the London and Home Counties J.E.A., which is already operating over an area of 1,750 square miles, will probably have acquired most of the undertakings in the counties around London, and will offer the then holders of shares of the London electricity supply companies fair terms for the taking over of their properties.

Profits, Dividends, and Prices

The standard rate of dividend of the London companies is fixed at 7 per cent., but, under the Act, companies can make reductions in the price of their current in such manner as will enable both the consumer and the shareholder to benefit. The London companies mostly take their "juice" from the London Power Company, and act as distributing agents throughout the area over which they function. The profits made by the companies can hardly fall below 7 per cent., but, on the other hand, there is a prospect of their showing such an increase as will enable extra profit to become divisible between consumers and shareholders, as already observed.

In the case of the County of London Electric Supply Company, as in that of two or three of the others, part of the area lies outside the range of influence exercised by the Central Electricity Board, and those companies will be able to expand in a manner likely to prove very satisfactory to their proprietors through the increase of dividends as the result of the increase of profits. With those companies whose dividends are limited to the standard rate, the chance of advance in dividend rests upon the expansion of the use of electricity, as to which expansion it would be absurd to suggest any doubt. The official returns of the Electricity Commissioners, giving the total amount of electricity generated during the past decade by the authorised undertakers and railway and tramway authorities in Great Britain, show such a consistent advance as to indicate that through bad times, as well as good, electricity experiences an increased demand.

The Strength of Electricity Supply Shares

Reference has been made above to the rise in the prices of electricity supply shares which has taken place during the past few months. It is of interest, and also of service, to take the comparison a little farther back and to place to-day's quotations against those which ruled at the beginning of the current year. These comparisons will demonstrate, more clearly than pages of print could possibly do, the confidence which is felt in the field of electrical development by people the majority of whom have inside knowledge of the industry into which they have placed their money and who are on the look-out for opportunities to add to their holdings through the purchase of what shares come to market. So well held, however, are the ordinary shares of the best-class electricity supply undertakings that it has become a matter of real difficulty for the Stock Exchange broker to supply to his client the particular shares which the latter desires to purchase.

There is, in other words, a very restricted market, the reason being that holders of the shares are so well content with their investment that they seldom desire to change, and this in itself is evidence which to the newer purchaser should bring a feeling of security in his investment. The following tables give a selection of the best-known electricity supply companies, comparing to-day's prices with those at the beginning of the year :—

LONDON COMPANIES.

Ordinary Share.	December 30th, 1931.	Now.	Rise.
Brompton	27/6	32/–	4/6
Charing Cross	29/–	32/6	3/6
Chelsea	26/–	32/–	6/–
City of London	35/–	42/6	7/6
County of London	43/3	47/6	4/3
Kensington	29/–	33/–	4/–
Metropolitan	37/6	45/–	7/6
St. James' and Pall Mall	29/–	32/–	3/–
South London	25/6	32/–	6/6
Westminster	28/–	33/–	5/–

PROVINCIAL COMPANIES.

	December 30th, 1931.	Now.	Rise or Fall.
Bournemouth and Poole	2¾	3¼	+12/6
Clyde Valley	30/9	30/–	– –/9
Elec. Dis. Yorkshire	33/–	38/3	+ 5/3
Lancs. Light and Power	24/6	28/9	+ 4/3
Midland Counties	26/3	31/3	+ 5/–
Mid. Elec. Power	28/9	33/6	+ 4/9
Newcastle-on-Tyne	23/3	25/–	+ 1/9
Northampton	40/3	45/–	+ 4/9
Scottish Power	27/–	31/3	+ 4/3
Yorkshire Elec.	31/3	37/–	+ 5/9

It will be noticed that the groups have been divided into London and Provincial. Looking at it from the investment point of view, the provincial companies' shares are usually regarded as offering a wider scope for increased dividends, though at the same time they may possibly be considered as less gilt-edged than those of their brethren in the London list.

Bonus Issues

Where a company is steadily expanding its area of influence, fresh capital is, of course, frequently required, and in order to raise new money the companies have adopted the principle of issuing new shares to their proprietors at prices that compare favourably with the market prices for the existing shares, and which, therefore, offer a bonus to the allottees. Experience has shown that most of the latter take up their new shares when they have such an opportunity, but in studying yields offered by shares in the provincial companies' group this occasional issue of new shares at bonus prices, while it cannot be given a definite value, must not be overlooked.

The circle of investment in the shares of electrical supply and allied undertakings has widened enormously during the present century, and so great is the faith reposed in the present management and the future prospects that the shares, as reference to our price list will witness, stand at levels that give a modest yield on the money.

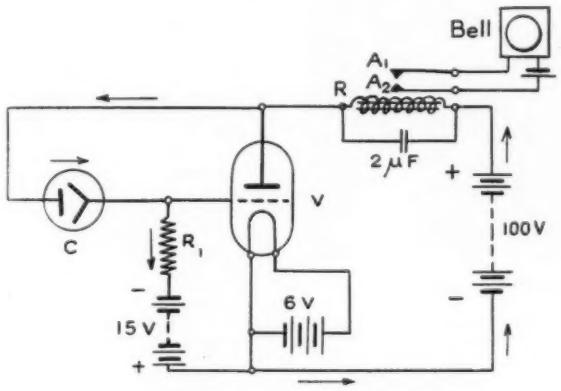
The arrangements made by the companies with the various electricity authorities and boards are of such a nature as will foster—not impede—progress. There is no reason to fear interference with the normally healthy expansion of individual companies, and anything in the shape of confiscatory legislation is the last thing that need be apprehended.

Submarine Cable Testing. By A. Rosen, Ph.D., A.M.I.E.E.

An interesting application of the photo-electric cell

SUBMARINE cables are generally made in continuous lengths ranging from a few miles to several hundreds, and during the processes of manufacture it is desirable to keep an uninterrupted watch on their electrical properties. For testing resistance all the conductors are joined in series, making a continuous circuit which is connected to form part of a Wheatstone bridge. The bridge is balanced and the null point indicated on a sensitive reflecting galvanometer by means of a spot of light on a scale; any change of resistance in the cable produces a movement of the galvanometer spot. A continuous watch on a spot of light for hours at a stretch is very tiring, and I have enlisted the aid of the photo-electric cell to relieve the strain, with very satisfactory results.

The requirements were that (*a*) an alarm, such as the ringing of an electric bell, should be given when the galvanometer spot moved in either direction off the zero point, (*b*) the bell was to continue to ring even if the spot returned to zero, until the circuit was restored by the operator, (*c*) the alarm was



The simplified circuit, using batteries

to be given if any of the components of the circuit failed, and (*d*) the set had preferably to function off 120-V d.c. mains.

The Simplified Circuit

The photo-cell circuit was first tried out with batteries. In the simplified arrangement illustrated the cell C is an "Osram C.M.G.8," and is placed so that it is illuminated by the light reflected from the galvanometer mirror when the spot is in the zero position. The valve V, which is used as an amplifier, is an "Osram 610" taking 0.1 A in the filament circuit, and the high-tension voltage is common to the cell and the valve. The path of the photo-cell current is shown by the arrows—it passes from the battery positive to the cell anode, then to the cell cathode, and through the 10-megohm resistance R_1 to the battery negative. Thus (if we ignore the slight shunting effect of the grid-filament circuit of the valve) there is a p.d. across the resistance R_1 of 10 V per micro-ampere of photo current, and this voltage tends to make the grid of the valve positive.

An opposing grid-bias voltage is applied so that there is just sufficient plate current flowing to attract the armature of the high resistance relay R. When the spot moves off the cell, the photo current is reduced and the grid becomes more negative. In consequence, the plate current falls and the relay armature is released. This closes the contacts A_1 A_2 which complete the local circuit containing a battery and an alarm bell. The photo current depends on the anode voltage and on the nature and amount of light falling on the cathode. With about 100 V and the light from a 4-W lamp the current was of the order of 1 micro-ampere and −15 V was found to be a suitable value for the grid bias of the valve.

In the simplified arrangement the alarm bell circuit is opened when the spot returns to zero and thus condition (*b*) is not fulfilled. The method of carrying this out is shown in the diagram of the complete circuit, which also depicts the manner in which the circuit was adapted for use on 120-V d.c. mains. The relay is provided with a second pair of contacts B_1 B_2, which are closed when the armature is attracted, and the connection from the positive of the supply to the photo-cell anode is made through these contacts. When the relay armature is released by the darkening of the cell, B_1 B_2 open, thus cutting off the voltage from the cell; should the cell be then reilluminated, no photo current can flow, and the alarm continues to sound. The circuit is restored by short-circuiting the contacts B_1 B_2 momentarily by the switch S.

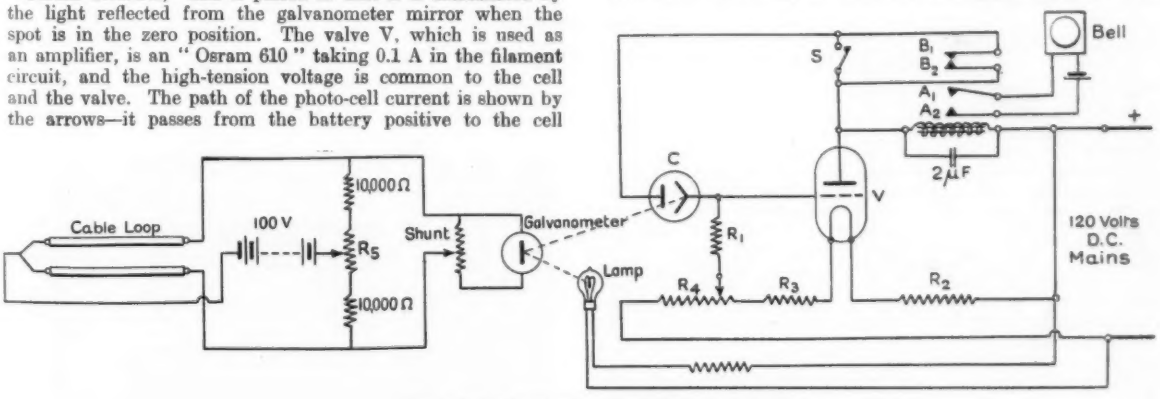
The photo-cell current follows the fluctuations in the light with no appreciable lag; however, the self-inductance of the relay tends to delay the release of the armature when the plate current falls, and it is necessary to shunt it by a condenser of the order of 2 mF to reduce the delay. The fixed resistances R_2 R_3 of 900 and 100 ohms respectively together with the 100-ohm potentiometer R_4 limit the filament current to 0.1 A, and the grid bias can be varied by means of the potentiometer between −10 and −20 V. Failure of the cell, the valve filament, the lamp which lights the galvanometer, or the mains would cause the alarm to function, and no batteries except the one in the local bell circuit are required.

The bridge circuit used is also shown. The circuits in the cable consisted of pairs, and hence the conductors were joined up so that the two wires forming a pair were in opposite arms of the bridge. In this way, changes of resistance due to variations of temperature had no effect on the balance. In one case the total resistance of the cable loop was about 20,000 ohms, and equal 10,000-ohm ratio arms were used. The battery p.d. was 100 V, and a galvanometer of 10,000 ohms resistance with a universal shunt to vary the sensitivity was employed. The variable resistance R_5 served to compensate for the initial unbalance in the circuit, and it was found that the bell would ring when this resistance was unbalanced by 0.1 ohm, corresponding to a detector current of about one hundred millionth of an ampère. The arrangement could be made more sensitive, for instance, by limiting the area of the electrode illuminated.

Amplification Obtained

The current flowing in the local circuit when the relay was actuated was 0.3 A, so that the combination acted as an amplifier with a current ratio of thirty million to one. This amplification is made up as follows:—A change of 10^{-6} A in the galvanometer circuit produced a change of 10^{-4} A in the photo current, an amplification of 100 to 1; the change in the plate current of the valve was about 5 mA, the amplification in this stage being 5,000 : 1, and this produced a change of 300 mA in the local circuit, representing an amplification of 60 to 1. The total is $100 \times 5{,}000 \times 60 = 30 \times 10^6$. It will be seen that the valve contributed the largest proportion of the amplification. Considering the power, the figures are even more striking: the power in the galvanometer circuit was 10^{-12} W, and the power in the alarm circuit was 1 W, representing a magnification of a billion times.

The circuit described was found to be quite stable, and the apparatus could be left for long periods without attention. The assistant on watch could therefore be performing other duties. A similar arrangement could no doubt be used on board ship and at the shore stations during cable-laying.



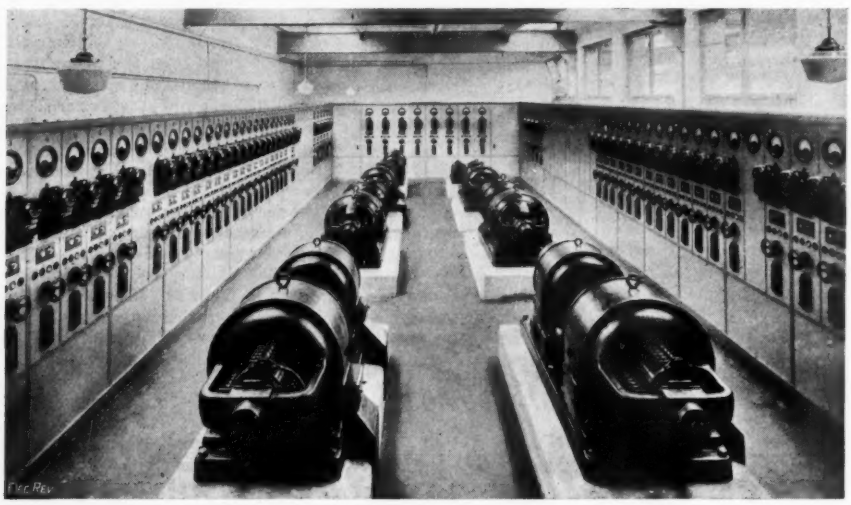
The complete circuit on 120-V d.c. mains

Swiss Electric Postal Vehicles

An interesting automatic battery-charging installation

ONE of the largest fleets of electric motor vehicles on the Continent is that operated by the Swiss Post and Telegraph Authorities in Zurich. The fleet at present consists of no fewer than thirty-four vehicles, all of which were constructed by the Elektrische Fahizeuge Gesellschaft, of Oerlikon.

Seven of the vehicles are four-wheel vans, having a carrying capacity of two tons each, and fitted with 250-Ah batteries that enable a distance of from thirty to thirty-seven and a half miles to be run on one charge; ten vehicles are three-tonners, eight of these having 500-Ah batteries, giving from fifty to fifty-six miles on one charge; three are four-wheel tractors, capable of hauling trailers with five- to eight-ton loads, while fourteen are three-wheel vans adapted to carrying a load of 6 cwt., and to run about thirty-seven and a half miles on a single charge of the 200-Ah battery.



The convertor room of the Zurich Post Office battery-charging installation

The batteries used on the vehicles are mainly of the Swiss-made lead types, although one of the three-tonners is provided with a 350-Ah "Exide" battery made by the Chloride Electrical Storage Co., Ltd.

A feature of the installation is that provision has been made for the battery recharging to be automatically performed, it only being necessary for the driver on bringing in his vehicle to the station to connect it to a charging plug. The automatic features of the battery-charging installations are designed so that (1) the charging plant is limited by the amount of energy stored in the batteries as well as by the charging voltage; (2) the charge is continued after any temporary failure of the main a.c. supply; (3) the charge-limiting device operates accurately for the voltage drop in the d.c. bus-bars; (4) any battery is discontinued if internal short-circuits occur; and (5) the set is shut down when the last battery is completely charged.

The electricity supply in Zurich being alternating, a special a.c. to d.c. convertor room (illustrated) has been equipped by the Brown Boveri Co., of Baden, in which a series of eight three-phase synchronous electric motors directly coupled to d.c. generators are installed, these supplying current through the switchboards (one for each charging plug) arranged along the sides of the room.

The motors are provided with a centrifugal starter motor so that they can be connected to the system without any additional starting operation having to be performed. The convertor sets are protected against excessive current on the a.c. side by thermal releases, and on the d.c. side by fuses. Should the voltage on the three-phase side fail, the time relay and all the contactors of the plant will trip automatically, put the sets immediately out of operation, and interrupt all the charging circuits. The arrangement is such that the sets automatically restart when the power supply is resumed.

The d.c. generators are provided with a counter-compound winding which automatically increases the charging voltage as the charging current decreases, corresponding to the charging characteristic of the battery. The charging voltage relay has also, in addition to the voltage winding, a current winding through which the charging current flows. This current coil is so dimensioned that account is taken of the voltage drop in the connections between generator and battery which varies with the different charging currents.

Although the fleet at present comprises a total of only thirty-four vehicles, a considerable extension is contemplated in the near future, as the battery-charging equipment installed and described above is provided with a total of sixty-two control boards and charging plugs.

Electricity in the Building Industry

THE Nottingham works of Messrs. Simms, Sons & Cooke, Ltd., offers convincing proof that the electrical drive is essential for real efficiency and economy in the building trade. The single-storey building which houses all the woodworking machinery is exceedingly well lighted, both as regards daylight and artificial illumination. There are 105 "Mazdalux" shades, each with a 300-W lamp, in the machine shop.

Every class of woodwork utilised by the modern contractor is undertaken by Messrs. Simms, and the total h.p. of all machines employed is approximately 400, whilst the most powerful individual motor is of 65 h.p. and drives the main rotary fan for the powerful suction plant installed throughout the factory. Electricity is supplied by the Nottingham Corporation at 6,500 V. This is stepped down to 440 V (3 phase for power) and 230 V (single phase for lighting).

The motors are of B.T.-H. and Crompton Parkinson make, and all machines are belt driven. In one or two cases, however, the motors are coupled direct to the driving shaft and belts are run from the main shaft to various points on the machine. The machine taking the largest h.p. is the four cutter illustrated on page 200 which consumes 30 h.p. for ordinary work and, in addition, is provided with a 2-h.p. motor to drive a special attachment for flashing and recessing when the occasion demands. This four cutter was made by Messrs. Sagers, of Halifax, and its accurate and quick work eliminates expensive and tedious moulding processes.

The double-ended tenon machine (automatically fed) is equipped with a 20-h.p. Crompton Parkinson motor, 715 r.p.m., and completes two tenons of any class during one passage through the machine. There are two circular saws attached to the latter, which cut off timber to any required length.

While not attempting to describe in detail all the interesting machines, mention must be made of the lightning rip which accurately trisects timber and thus saves three operations with the circular saw. The machine is driven by a 15-h.p. Crompton Parkinson 2,900-r.p.m. motor and the automatic feed has a 3-h.p., 950-r.p.m. Crompton Parkinson motor with an Igranic push-button starter.

A monthly maintenance service carried out by a well-known firm of electrical contractors keeps all the motors in first-class condition and minimises expensive breakdowns. All machined work is assembled in the bench shops and then primed by means of "Aerograph" spraying equipment. Some idea of the efficiency and speed of this all-electric plant may be judged by the fact that when fulfilling one of their many contracts Messrs. Simms were able to hand over to the municipal authorities finished houses at the rate of 100 per week.

One of the three-wheel electric vans employed in the Zurich postal service

Resonant Frequency Meters. By H. D. Hawkes

A type of instrument of considerable importance on the grid system

THE use of differential resonant circuits for the operation of instruments for measurement of frequency cannot under any consideration be claimed as a new principle. In this country the British Thomson-Houston Co., Ltd., several years ago produced a frequency meter of the double moving-coil pattern operated differentially by two series resonant circuits, one circuit being tuned to a frequency above the normal and the other to a frequency below the normal. A more recent production is the differential moving-iron instrument described in the ELECTRICAL REVIEW of May 20th, page 735. These instruments depend for operation upon the change in current produced by a change in frequency upon a series resonant circuit.

Figs. 1 and 2 show the vector relation of current and voltage of two separate series resonant circuits tuned to resonate at 10 cycles from the normal frequency, which is assumed to be 50 cycles. On the lower resonant circuit, fig. 1, where V is the voltage supply and I_{40} the current at 40 cycles, a rise in frequency will produce a predominant inductive reactance, causing the current to diminish in magnitude and also to lag behind V by the angle of ϕ_1. Similarly, on the higher resonant circuit, fig. 2, where I_{60} is the current at 60 cycles, for a fall in frequency the capacitive reactance of the circuit would predominate, and the current would fall away at an increasing angle on the leading side.

The vectors I_{40}, I_{50}, and I_{60} are representative of the current in each resonant circuit at 40, 50 and 60 cycles respectively, the corresponding phase displacement being shown by angles ϕ_4, ϕ_1, ϕ_3 and ϕ_2.

Therefore a differential instrument which makes use of not only the changes in current but also the corresponding changes in power factor will have a much greater sensitivity than one operated only by the differential changes in current due to two tuned series resonant circuits.

Such an instrument has been developed by Elliott Brothers (London), Ltd., in conjunction with Mr. G. F. Shotter, of the

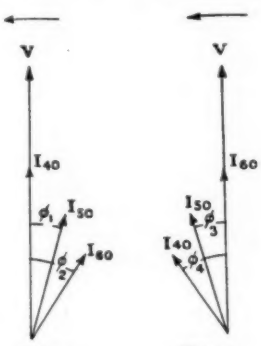


Fig. 1

Fig. 2

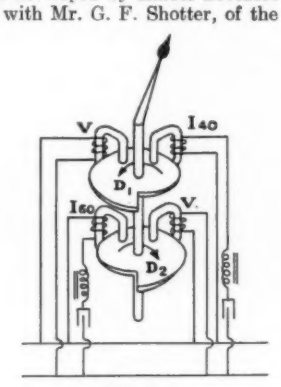


Fig. 3

North Metropolitan Electric Power Supply Co. This instrument is, in effect, a differential induction wattmeter of the bi-polar type. The schematic arrangement of the instrument is shown in fig. 3.

D_1 and D_2 are special cam-shaped discs mounted on a common spindle, and operated upon by the electromagnets VI_{40} and VI_{60} respectively. The V magnets are excited directly from the supply, or a ratio of the supply voltage; I_{40} and I_{60} have each in series, capacitance, inductance, and resistance, and are thus arranged to resonate at a definite frequency above and below the normal. The torque produced on the discs is such that D_1 tends to move in an anti-clockwise direction, while D_2 tends to oppose this movement, and by means of the shaped discs the deflection is controlled for the range of frequency required. By this system an indicating instrument is obtained giving a 220 deg. deflection for a frequency change of plus or minus 2 cycles from the normal frequency (fig. 4). the differential control being very high for the class of apparatus.

Great Accuracy

Invariably the first question asked on the introduction of a new instrument of this type is, how will the accuracy be affected by an applied complex voltage wave? The most effective answer is probably to state that tests carried out by the National Physical Laboratory on a standard stock 50-cycle indicator show that the indication is unaffected when the instrument is supplied with a voltage wave of form factor 1.31.

It can be proved that whereas the differential torque produced by the current in two tuned series circuits is displaced by the introduction of harmonics in the impressed voltage wave, the corresponding effect on the suitably designed differential induction wattmeter system, as already described, is relatively small.

To avoid change in instrument reading due to a change in voltage supply the main choke coils in each of the resonant circuits are arranged to have comparatively large air gaps, the resulting changes in flux density thus produce negligible shift in inductance. The actual figures given for the standard 50-cycle indicator are ± 0 per cent. for ± 10 per cent. change in voltage supply, and ± 0.05 per cent. of indication for ±20 per cent. change in voltage supply.

Fig. 4

The temperature coefficient of this type of instrument is exceedingly small, being approximately ± 0.005 per cent. per 1 deg. C. This small error is not the result of a complex system of compensation, and would not appear at all were it not for the very small change in phase angle on the V coils produced by the inevitable change in resistance. This error could be adequately compensated for if thought necessary.

A frequency recorder has been developed by Messrs. Elliott on exactly the same lines as the indicator. The comparatively small angular deflection required, and the introduction of a double differential movement resulted in the production of an instrument giving a 3¾ in. straight line chart for ± 1 cycle. This recorder is directly operated, the differential control being 40 grs. cm. for 90 deg. deflection. An instantaneous record can be obtained of any normal circuit frequency variation.

A unique feature of the instrument is that although the chart has straight line ordinates it has linear dividing; this is obtained by adjusting the differential torque curve to compensate for the pen action when travelling across the chart. The burden of various instruments is given approximately as follows :—

Type.	Nominal range.	Voltage range.	VA.	Watts.
Indicator	25	110 or 220	8	5
Recorder	25	110 or 220	18	10
Indicator	50	110, 220 and 440	14	6
Recorder	50	110, 220, or 440	21	10

For the purpose of calibrating these very sensitive frequency measuring instruments, Messrs. Elliott have produced a laboratory standard indicator, similar in construction to the switchboard instrument, but of even greater accuracy. A knife edge pointer, 5 in. in length, moving over a mirrored scale gives an angular deflection of 76 deg. for 1 cycle per second. The scale dividing is such that 1 division corresponds to 0.01 cycle, and the accuracy of calibration is given by the National Physical Laboratory to the nearest 0.005 cycle per second.

The differential resonant induction wattmeter principle has been applied in the production of instruments of nominal frequency ranges from 25 to 1,000 cycles, and there is no reason to suppose that instruments for a very much higher frequency could not be designed.

The "Alexander Kennedy"—the first of a fleet of four coal carriers for the new Battersea power station

The Labour Party's Electrical Policy. By Henry M. Sayers, M.I.E.E.

THE Executive Committee of the Labour Party has issued a report embodying proposals for the future organisation of the electricity supply industry, for consideration at the annual conference in October. After reviewing the history of the legislation controlling the industry, the report emphasises the unsatisfactory position of the distribution and sales organisation, shown by the wide variation in prices charged to consumers, the variety of systems, frequencies, and voltages, the lack of efficient service, and the consequent handicapping of consumption. These features and the relatively high costs of distribution are attributed to the multiplicity of ownership. Generation is being dealt with on a national scale, but the advantages of this unification cannot be fully reaped unless distribution is similarly organised.

A National Electricity Board

In order to bring about the desired improvement the report makes the following proposals :—

(1) The establishment of a National Electricity Board to which should be transferred all authorised electricity supply undertakings, the national grid, railway and traction generation, and certain non-statutory undertakings. Powers should be given for the acquisition of private generating plant, if and when desirable. This Board should take the places of the Electricity Commissioners and the Central Electricity Board, and should be responsible for the proper direction and efficient management of the nationally owned undertaking.

The members of the Board should be appointed by the Minister of Transport; the statute establishing the Board should, as far as possible, lay down the national electricity policy and define the respective responsibilities of the Minister and the Board; the Minister should have powers of checking the Board's activities; full reports should be published; Parliamentary criticism and control should be maintained by discussion on the Ministry of Transport vote, perhaps by more specific methods; but the Board should be responsible for its conduct of the industry.

(2) A National Consultative Committee should be appointed by the Minister of Transport, representative of consumers, labour in the industry, local authorities, &c. This body should meet at stated intervals when complaints could be ventilated, and proposals made and discussed with the Board, but the Committee should have no executive powers and not relieve the Board of responsibility.

(3) The local administration of distribution cannot well be centralised, although the direction of technical and public policy must be on a national basis. Regional Boards might be set up to which certain local functions might be delegated. The executive officers in each region should be officers of the National Board, not of the regional one. Regional and district offices and showrooms should be established.

Mr. H. M. Sayers is a well-known consultant who has from time to time contributed critical articles to our pages on electricity supply matters

(4) The basis of purchase of company undertakings should be the "net reasonable maintainable profit," discharged by the issue of National Board stock of appropriate amount to the proprietors. For local authority undertakings, as the transfer would simply be from one public authority to another, the national board should take over the debt obligations of the owners—it is not proper that they should either make a profit or be left in debt as a result of the transaction.

The Committee believes that the reorganisation of coal and power under national ownership and control is a vital step in economic progress, and that the policy outlined will achieve large economies with advantages accruing to industrial production and to the domestic consumer. Electricity supply is one of the key industries in any sound policy of national planning and it ought to be under national ownership and control.

The Proposals Examined

It is hardly within the scope of this article to discuss the general policy of the national ownership of the means of production and exchange of which these proposals form a part; but it is not wise to dismiss them as merely an item of Socialist policy of no practical importance or significance. The cries of "nationalisation" and "socialistic policy" were raised against the 1926 Act without much effect; there was a clear case on economic and technical grounds for the organised control of generation recognised by a Government and both Houses of Parliament, all of the Conservative persuasion.

Within the last two or three years opinions have been voiced within the industry that the present localised multiple organisation of distribution is not satisfactory; some bodies representative of consumers are also dissatisfied. Therefore, any proposals for improvement are deserving of consideration on their merits. The questions for consideration are: What are the manifest disadvantages of the present conditions; and how can they be remedied?

The disadvantages may be divided under the heads of technical and administrative, but the two are not entirely independent. The chief technical disadvantages are the numbers of systems, frequencies and voltages, which impede the spread and interconnection of distributing systems, and increase the cost of consuming appliances. The frequency difficulty is in process of removal under the operation of the 1926 Act; the replacement of d.c. by a.c. distribution is in progress; its areas will not be much extended, probably it will dwindle even in the heavily loaded areas where is seems firmly established; standardisation of voltages is also in rather slow progress. All these items of standardisation involve expense; the difficulties of adopting them are mainly financial, and in many cases it is not clear that the non-standard undertaking will benefit in the near future by changing over.

It may well be considered whether that hindrance should not be reduced by some such arrangement as that in course of application to the frequency problem. It would be easier for a district organisation to finance the changes in some small undertakings than for those undertakings to meet the expense by themselves; it seems reasonable that the assisted undertakings should bear a part of the resulting capital charges as soon as they are able.

The Need for More Uniform Tariffs

The administrative difficulties are more serious. That which is most in the public eye, the basis of Press agitations and reproaches, is the great range and diversity of prices and tariffs; even as between areas which seem to be similar in the circumstances likely to affect costs. The difference between generating costs and selling prices is a general ground of criticism which would be weakened by more uniform prices and tariff systems. In every area systems of charging have been developed by a process of trial and error; or mere expediency, rather than by the application of reasoned principles. That apparently haphazard feature is manifested in very different degrees, some undertakings seem to have followed definite policies with more or less consistency. A comparison of tariffs in areas of similar characteristics can hardly lead to any other conclusion than that some of them must be wrong.

It is a difficult matter to uproot established tariffs and substitute new ones, however desirable it may be to rectify the conditions; someone is certain to complain, those who benefit are mostly dumb. A district organisation empowered to standardise tariffs would be less amenable to local pressure than the individual undertakings. Conferences of district organisations would be able to settle general principles for the formation of "tariff structures," with such differences in price coefficients as were justifiable by local conditions.

Uniformity of prices over the whole country is not practicable, but uniformity of principle is possible and desirable. It seems obvious on general principles that any system under which some classes of consumers pay more than they should and others less is detrimental to the industry and to the general body of consumers.

The Curse of "Parochialism"

Another chief administrative difficulty attaching to the present distribution organisation is that of the rigid delimitation of areas of supply. It is common ground that the "parochial" limits have prevented or delayed extensions economically and otherwise desirable. The procedure of obtaining extension Orders is dilatory and expensive, and opposition to such extensions is often due to local jealousies not relevant to the merits of the case. If areas of supply had been allowed to grow freely there would be fewer districts without supply to-day. It is true that there is now less opposition than formerly, and that the Commissioners are definitely encouraging and pressing extensions. District organisations would be able to fill up the blank areas on a rational plan without regard to local rivalries.

Means of forming such district organisations have been pro-

vided by the 1919 Act. Joint Electricity Authorities could do most of the things desired—things not so easily achieved by separate undertakings. The supply of rural and "thin" areas involves the question of tariffs. The cost of distribution in such areas is inevitably greater than in those more densely loaded, though considerable cheapening has been achieved and more seems possible. Town consumers can hardly be called upon to pay a large part of the cost of supplying country folk. The problem of supply at attractive prices has been shown to be capable of solution by the application of sound principles of tariff formation. Again, this could be better done by a district organisation which could take the best advantage of load diversity all over the district. It seems therefore that the Labour proposals in respect of district organisation are not irrational and not without support within the industry.

Is National Ownership Desirable?

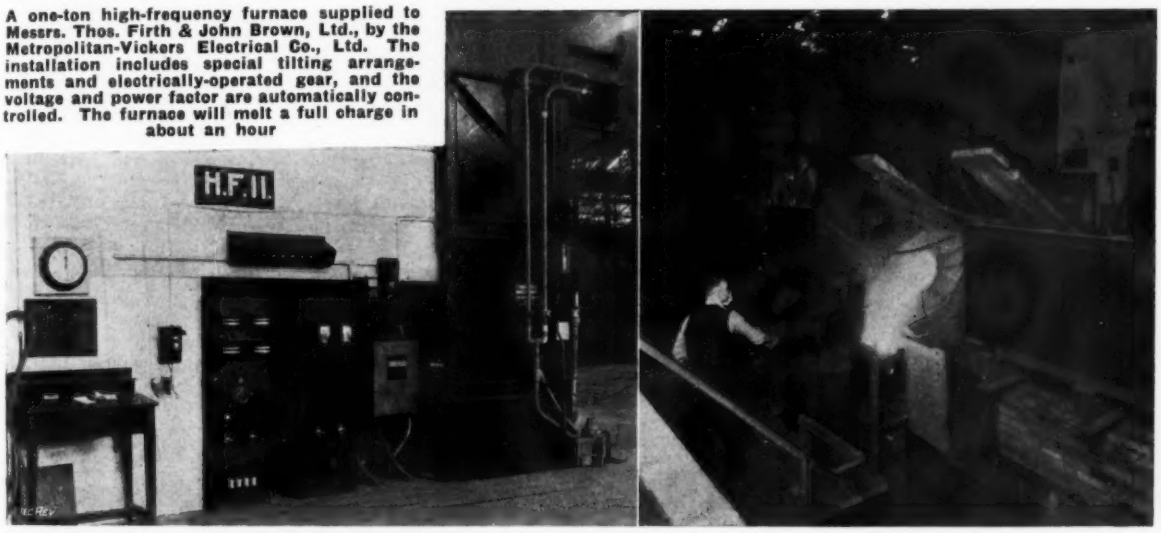
The proposals for national ownership of the whole industry are of a different order. The onus of proof that it would be nationally advantageous lies upon its proponents; no very cogent arguments are set out in the report. The suggestion that the National Board should supersede the Commissioners is not attractive. A monopolistic undertaker over the whole country might become rather a burden. The main duties of the Commissioners include those of seeing that undertakers use their powers and discharge their duties properly; advising, persuading, sometimes admonishing, undertakers in that regard. It is a general principle that statutory bodies shall be under specific supervision. The Labour report suggests that the Minister of Transport should perform those functions in respect of the National Board, but in practice officers of the Ministry would do the work, and they may just as well be called Electricity Commissioners with specified duties and powers.

The terms of purchase suggested in the report would not be willingly accepted by undertakers in general, and perhaps the municipal authorities would put up more powerful objections than the companies. On the whole, it seems better that the more efficient organisation of the industry should be allowed to develop by consent, removing some of the statutory obstacles to co-operation. The anti-company sentiment of local authorities seems to be weaker than it was a few years ago; it has been a hindrance of serious magnitude.

One item of large and growing importance in distribution is payments to the rates; it is a misfortune that distribution mains are rateable "hereditaments," an inequity shared by gas and water mains and some other properties not within the knowledge of the framers of the original legislation which has been held to cover such things. The report is silent on this.

If the forthcoming conference of the Labour Party discusses the report with the object of shaping a practical policy likely to win the assent of those immediately concerned it may do good service. What the party decides is of more than academic interest. It is the second largest in the country, and it is therefore right that the proposals put before it should be criticised from a practical point of view.

A one-ton high-frequency furnace supplied to Messrs. Thos. Firth & John Brown, Ltd., by the Metropolitan-Vickers Electrical Co., Ltd. The installation includes special tilting arrangements and electrically-operated gear, and the voltage and power factor are automatically controlled. The furnace will melt a full charge in about an hour



The Royal Lancashire Show

THERE were many features of electrical interest in the agricultural implement and machinery section of the Royal Lancashire Agricultural Show held at Moor Park, Preston, from July 28th to August 1st. In the near future electricity supplies will be available for the whole county, and by November the Preston system will have reached Garstang. The Preston undertaking covers the whole of the rural area north of the Ribble, and that to the south is covered by the Lancashire Electric Power Co., Ltd. In these areas the tariffs are under a penny a unit. The farmers, particularly the poultry farmers, are realising the great use to which electricity can be put, there being over 150 with large electrical demands in the Preston area. Over 250 farms in the Lancashire Electric Power Company's area are connected up, and the number is still increasing.

One interesting appliance seen in the Show was the "Electrimmer" which is a product of Skilsaw, Inc., Chicago (sole British distributors, Messrs. J. Harrison & Co. (Liverpool). Ltd.). This is a new electric hedge trimmer, compact, neat and sturdily built, which can be worked with one hand. The implement has a ¼-h.p. universal motor and a crucible-steel cutter blade, 11 in. in length, and the motor and gear housing are made of die-cast aluminium. The weight is approximately 6 lb., and 15 ft. of rubber-covered flex is supplied.

Messrs. J. Harrison & Co. also exhibited an "Insekiller," consisting of a source of light (incandescent lamp or mercury vapour tube) around which there is a series of wires ¼ in. apart through which an electric current is circulated. While the current is strong enough to kill instantly all insects as they seek the light source, it is harmless to human beings or animals. The models shown were fitted with readily detachable bases with a bait receptacle for insect lures. An automatic switch cuts off the current when the base is removed for cleaning purposes. In the bell of the appliance a small transformer is housed.

The General Electric Co., Ltd., showed a "Magnet" soil-heating cable which has been specially developed for burying in the soil of hotbeds, garden frames, &c. The cable consists of a conductor of resistance wire insulated with heat-resisting material, lead covered, jute braided and impregnated to protect the lead covering from corrosive action. It is supplied in standard lengths of 50 yd. for use on 230 V, each length being loaded to 700 W. A local test proved that tomato plants subjected to this form of heat bore fruit at least one month before untreated plants.

The Lancashire Electric Power Co. displayed various forms of domestic electric cookers, but was advocating to a great extent the use of electricity on poultry farms. This company installs every type of electrical apparatus for the poultry farmer and charges very low rates for energy.

Curfew Electric Heaters showed their all-metal electric battery brooder. Each section of the battery consists of a "Curfew" electric brooder and wired run, the sections being arranged to stand on top of each other to form a tier or battery. Plugs are arranged for the electric controls to connect into each other. Another electric battery brooder was shown by Mr. S. Pye, the average consumption of this being 9 kWh per day for the 1,500 chick size. The Cooper-Stewart Engineering Co., Ltd., exhibited its electric "Shearmaster," a combined shearing and clipping machine.

Other exhibits of electrical interest were refrigeration plant for the dairy, consisting of 100 c.f. cold store, milk cooling and ice-cream plant, by Coldair, Ltd.; steaming stools, pasteuriser and agitator, bottle washer, bottle-filling machine, and wash trough by Messrs. Barford & Perkins in conjunction with Messrs. Bastian & Allen, Ltd.; a bottle-filling and capping machine by the Graham-Enoc Manufacturing Co., Ltd.; milking equipment by Messrs. Gascoignes (Reading), Ltd.; a farm motor by the English Electric Co., Ltd.; a pig food steamer and "Morganite" heater by Electric Fires, Ltd., and Messrs. Barker, Young & Co., Ltd.; a hay elevator by Messrs. E. Dewhurst, Ltd.; and electric clocks by Messrs. Ferranti, Ltd.

The New "English Electric" Fires

ALTHOUGH the English Electric Co., Ltd., signified its entry into the domestic field a few months ago, when it introduced two new electric fires, the receipt recently of a priced leaflet describing the equipment suggests to us the first really serious selling attempt (for the 1932-33 season), apart from the spade work behind the scenes.

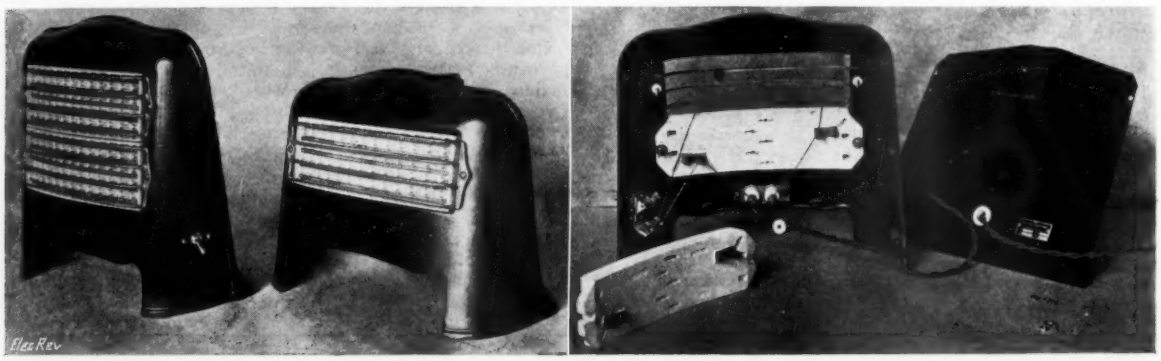
The company has certainly achieved its object of producing a fire of simple design in accord with modern taste, and one that can easily be cleaned. The curves of the frame are graceful and there are no corners. A close-fitting stove-enamelled metal sheet over the back of the fire is regarded as important in that it prevents dust being drawn across the elements. The heating spirals are in one continuous length in each element, and they are anchored sufficiently to prevent sagging or displacement.

A strong point is made of the fact that where the wire passes from one spiral to the next one above or below it a short straight length is substituted for the spiral in order to prevent local heating. The short straight pieces are anchored, and the anchors and the terminals are of non-corrodible metal. The ends are secured between nickel-silver washers, so as not to damage the skin of the wire. Pure nickel wire is used for the connections from the terminals of each element to the main terminals, and the last mentioned are mounted upon fireclay insulators in a comparatively cool zone.

On the twin flexible lead supplied already connected to the fire terminals the external covering is bared for a suitable distance and bound off at the cord grip, so that a length of rubber covering only is adjacent to the terminals, thereby eliminating any risk of leakage.

The flexible passes through a porcelain bush in the detachable fire back, and is secured on the inside to a substantial cord grip of insulating material, so that the pull cannot normally come on the terminals. Ross Courtney washers ensure a durable and efficient connection. Freedom from expansion and contraction of the fireclay formers is a feature.

There are two models, a 1-kW fire priced at 16s. and weighing 9 lb., and a 2-kW unit which weighs 15 lb., and is listed at 24s. 6d. Each model is available in any of nine standard finishes.



The new 2-kW and 1-kW "English Electric" fires and constructional details of the larger model

Telephony in Sumatra. By Walter Buchler

TELEPHONES were first used in Medan, the capital of Sumatra, in 1887, and were gradually extended to six other small towns on the east coast. There was also a system at Agin, which served the military railway.

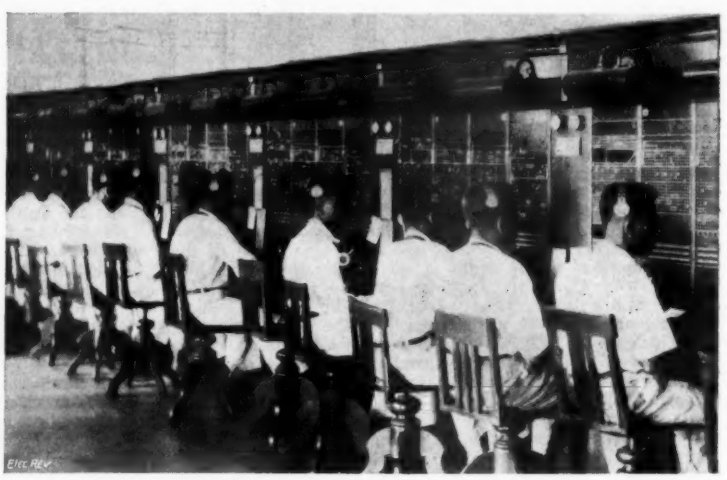
The Government system, operated on the magneto principle, is now being extended to all the more important towns. In 1931 Medan had about 2,900 subscribers, but the number has since tended to decrease owing to the general depression and the return of many Europeans, especially planters, to Holland.

Climatic conditions make telephone work very difficult; indeed a small automatic exchange in use experimentally for office calls has a glass cabinet to protect it from the humidity, which often reaches 100 per cent. Moreover, the apparatus in the central office has to be heated. Another difficulty is lightning, and both vacuum lightning arrestors and fuses are used to guard against accidents. Trees in this tropical climate grow very fast and the leaves are apt to come into contact with the wires. Trouble is also occasioned by ants making their way to the cables and eating the insulation. To prevent this, a material called Idjoek is used. It consists of the small leaves of a tree (Arenpalm), very dark when dried and thin like wires. The cables are wrapt in the dried fibre and as the termites enter they are suffocated or cut in half by the Idjoek closing round them. This is a peculiar feature of the material which is not only used for telephone cables but is also in general demand for roofing and other building purposes.

Metal Poles in Favour

At first only wooden poles were used, but for the past four or five years metal ones have gradually been added or substituted. In Medan and all the other more important places cables are laid underground at the side of roads, 75 cm. deep. Paper-air insulation is used and the metal covering (99.5 lead and 0.5 antimony) has been found to resist the attacks of termites much better when mixed with tin. All wooden poles are creosoted for a distance of half a metre above the ground.

The staff employed on telephone work consists entirely of men, as labour is cheap and women do not care to work in such establishments. The men start as apprentices and are put on exchange work when there is little traffic. They work seven to eight hours daily, and as they are much slower than European operators they are given only 120 subscribers. There is no telephone school in Sumatra, and experience is obtained only by practical work. All the operators speak Malay and some Dutch, the former being the principal language of the country, which Europeans also, as a rule, understand. The engineers are Dutch with experience acquired in Holland.



The Central Telephone Exchange at Medan

In town the telephone is mostly used for business purposes; only the better situated Europeans, Chinese, and natives use it for private calls, as the people are very economical. The subscription is guilders 13 a month for ten calls a day(for local use in Medan); for twenty calls a day G.19.50 is charged, and for forty calls G.26, there being the same rate for business and private installations. Trunk lines extend over a length of 308 km., and the rates range from 25 cents for a three-minute call to 75 cents for the maximum distance.

Desk telephones are mostly used and only a few have wall telephones. The service in Medan works quite efficiently, and though it is not as quick as in the west, it is good enough for a country like Sumatra where time is considered of little importance.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Consumers' Suggestions

It would be entertaining, and probably valuable as well, to make a collection of the suggestions made by members of the public in connection with electrical appliances. Many of these suggestions are, of course, fantastic and show a complete ignorance of both electrical and commercial conditions. Others, however, may possess the germ of something useful, and one has always to remember that a notion which seems absurd to the technical mind may be the very thing which leads directly or indirectly to an increase of business. One or two examples may be given to illustrate my meaning.

A user of electricity for lighting, heating and cooking recently made inquiries at a number of electrical centres for an electric fan which did not look like an electric fan. He had æsthetic objections to the standard type and he wanted something treated in windmill fashion or camouflaged after the manner of a gramophone or a wireless set by some attractive cabinet work. He was unable to obtain anything of this kind, and it is quite possible that he represents quite a numerous class who would utilise electric ventilation if the means were made to harmonise with the ordinary furniture of the room.

Another suggestion relates to electric cooking. The occasion frequently arises when a single small dish, such as a pie or a milk pudding, has to be heated up quickly. This cannot be done in the ordinary electric oven, and even if time is not very important it seems wasteful to heat up the whole oven space for the sake of a single small dish. Here the requirement is a small oven with an adequate loading as an auxiliary to the ordinary cooker.

Electrical salesmen probably receive many suggestions of a similar kind, and their natural tendency is presumably to dismiss them without much thought. A comprehensive collection might, however, form the basis for a useful discussion at an E.D.A. Salesmanship Conference. PROTONIUS.

July 29th.

The new open-air theatre at Scarborough—an evening view showing the lighting of the stage. The flood-lighted Castle is seen in the background

Switch Safety

In reply to Mr. J. W. Cooper may I once more plead for a simple and straightforward test for switch safety. This test *must* be made with the switch closed. There then will be no necessity to note the wattage of lamps in circuit, nor to remove any lamps in the way Mr. Cooper finds he needs to do in his method of testing. E. O. CATFORD.

Edinburgh, *August 1st.*

The Westminster Street Lighting Contract

Recent announcements regarding street lighting in Westminster are calculated to convey the impression, to the uninitiated, that the Westminster City Council has decided upon a drastic change from electricity to gas. In point of fact all that has happened is that the Council, in pursuance of its policy of renewing existing contracts for public lighting, has extended a gas contract for fifteen years in a somewhat modified form.

As an incident in the rivalry between gas and electric lighting, therefore, this contract is of much less significance than the recent substitution of electric for gas lighting in Piccadilly Circus. There are, however, one or two important points of public interest to which I should like to draw attention.

In the first place, the contract was renewed without competitive tenders having been obtained from the electricity supply authorities. It is essential to emphasise this fact, as the original announcement in certain newspapers stated that competitive tenders had been considered.

Secondly, the general trend of progress in the lighting field is towards the adoption of electricity. A notable instance is afforded by Scarborough, which recently decided to convert the lighting of the foreshore and certain main streets from gas to electric lighting. So far as industrial, commercial and domestic lighting are concerned, the gas industry has virtually admitted the supremacy of electricity.

Again, it is peculiarly unfortunate that the Westminster Council should have chosen this particular time to bind itself to use gas in any of its streets for so long a period as fifteen years. Only a few weeks ago an announcement was published regarding a new type of electric lamp suitable for street lighting, which promises to give several times the amount of light of the present type for the same consumption of current. When this lamp becomes available for general use, it will revolutionise public lighting, but the citizens of Westminster will be debarred from enjoying its benefits—at least in the streets covered by the contract under discussion—until close on the year 1950.

London, W.C., *July 28th.* ALEX. C. CRAMB,
Director and Secretary,
British Electrical Development Association.

The Effects of Electric Shock

I should like to give "E.A.M." particulars of a shock I received on June 6th.

(1) The immediate sensations felt during the passage of the current were a violent "shaking up" in the body, and a terribly loud buzzing noise in the head and ears. Vision was dim and fixed, hearing altogether lost, but most important of all was the complete loss of control of speech, *i.e.*, I was under the impression I was calling for someone to "pull the plug out," whereas I was continually mumbling "Stop it!"—so I was informed after I had been brought round. (The passage of the current was prolonged owing to the customer not knowing what to do.) I did not feel any burning pain in my hand.

(2) The voltage was 230 a.c., and the appliance an ordinary domestic iron—"earthed."

(3) The after-effects were a severe contraction of the heart and chest muscles, lasting three days, and a very badly burnt left hand having eleven separate wounds, eight of them severe, including three on the back of the hand, and the flesh on one knuckle very severely burnt.

At the present time I am unable to open or close the hand properly, and the little finger can only be lifted by force.

Manchester, *July 29th.* R. R.

The letter from "E. A. M." in your issue of July 29th brought to my mind an unfortunate incident in which I was involved some years ago.

The circumstances were "ideal" so far as the requirements for an electric shock were concerned. In each hand I held a piece of copper strip, connected by heavy flexible conductors to a 400/500-V 50-cycle circuit fed by an alternator capable of

an output of something like 50 b.h.p. The air temperature was probably 75° F. or more, and thus my hands were fairly moist.

When the shock occurred it seemed as if I had been seized by some tremendous power. I experienced great pain and I was quite helpless and seemingly in a state of intense stress. I could not hear, feel or see, although before my eyes there was a brilliant flickering light. I cannot recollect whether breathing was possible or not, nor can I say if my heart was functioning as usual.

A colleague had the presence of mind to drag the leads with copper strips (which, incidentally, I was told, were clutched so tightly as to be bent out of shape) from me. So far as can be estimated, the duration of the shock was in the neighbourhood of ten seconds. My rescuer informed me that I was an appalling sight, for, although no sound was uttered, my eyes protruded and mouth gaped wide open. I found myself lying back downwards, "seeing stars" as if I had sustained a blow on the head. I wish to emphasise that although I was temporarily paralysed my mind was fully conscious, and reasoning powers were quite in order throughout the whole period. I was quite able to walk and in fact, at the time, felt very little the worse for my narrow escape although my hands were badly burnt.

About seven hours later, however, I noticed that when I raised or lowered my head a feeling of dizziness would set in, lasting perhaps for five seconds or so. The hand wounds were healed within two months but it was some six to eight months before the dizziness completely vanished.

I could never really understand the reason for these feelings nor could I realise the exact cause for the extensive burns as, presumably, the magnitude of the current passing must have been very small. It would indeed be interesting if "E. A. M." or other correspondents could throw any light on the subject for doubtless there must be many engineers who have had a much more prolonged shock than mine. R. P. EMM.

August 2nd.

In your issue of July 29th "E.A.M." asks for particulars of electric shock experiences. While I cannot describe the sensations, I think that the *cause* of a shock which I have received is worthy of note. It was due to a common and serious fault in the design of most iron connectors, that is, the upright metal spiral sleeve leading from the connector. Iron connectors should have *side entry* only for flexible leads, and such leads should be protected by a shock-proof rubber sleeve, as in a recently protected design. Iron manufacturers might make a note of this. R. ROBERTS.

Withington, Manchester, *July 29th.*

"Step on the Gas"

I have no particular desire to extend the circulation of the gas journals, but I feel that few of us who are engaged on the commercial side of the electrical industry can really afford to do without either the entertainment or the information they provide. A study of their columns affords a great deal of instruction on the ways of our chief competitor and a still greater measure of encouragement for ourselves.

We in the electrical industry are prone to disparage our efforts in propaganda and business development. The notion has got fixed in our minds that our rivals are more skilful, energetic and successful than we are. A cure for this obsession will be found in the loud lamentations of the gas journals over the advance (which they describe as State-aided) of electricity supply and over the disproportionate amount of publicity that electricity receives in the newspapers. Contrary to the general impression, electricity is mentioned in editorial columns more frequently than gas. It maintains this superiority in spite of the lavish expenditure of tens of thousands of pounds in advertising gas, and it owes its lead, in part at least, to the fact that electricity provides a much more varied crop of stories with a news value.

The moral of this contrast is, of course, that a material increase in the volume and vigour of electrical propaganda would have a paralysing effect on the spirits of the gas people.

Another interesting phase of the gas-electrical contest is the increasing degree in which electrical apparatus is being imitated. In a recent article references were made to a bayonet plug and socket for connecting up small domestic gas appliances; to a gas dish warmer; to a heater for an airing cupboard; to a gas standard lamp with a bayonet plug socket; and to a gas switch. In each case the gas appliance was based on an electrical model. The latest gas lighting fittings are frequently close imitations of electrical designs.

It is therefore evident that the electrical industry is now setting the pace for the gas industry. All that remains is for us to "step on the gas" in every sense of the term. A. G. W.

July 29th.

Scientific Management. (By Our Special Correspondent)

THE fifth International Congress on Scientific Management was opened on July 18th by Mr. T. J. Verschuur, the Dutch Minister of Labour, Commerce and Industry, in the Colonial Institute at Amsterdam. The congress lasted a week and investigated and discussed numerous important problems in scientific management. Among well-known figures in the international management field were Mr. L. Urwick, director of the International Management Institute, and M. Landauer, of the Comité International d'Organisation Scientifique. This organisation called the congress into being, in collaboration with the Netherlands Institute for Efficiency. During the week the delegates had the opportunity of visiting the Philips valve and radio factory at Eindhoven, the Van Nelle factory at Rotterdam, and the Zuyder Zee dam constructional works running from the mainland and the erstwhile island of Wieringen across to Friesland.

The Scope of the Congress

The subjects on which papers had been presented by many countries, covered market research, standard costs, foremen's education, training in scientific management, methods of promotion, budgets as a basis of bank credit, methods of increasing production, retail distribution, agricultural organisation, office management, and household efficiency methods. In their treatment of these diverse problems the representatives of the various nations tended to interpret the questions in different ways. The term "rationalisation" appears to be accepted as synonymous with scientific management in most Continental countries, whereas the two are distinctly different to the average British business mind.

Reviewing the proceedings it may be stated that some remarkably valuable papers were presented, and very stimulating —and often highly critical—discussions took place. The congress was well organised and proceedings went smoothly, although the translation needs of the meetings slowed up the pace considerably. However, the leaders of discussions and the chairmen in summing up the different criticisms and points of view put forward, had considerable capacity for grasping the essentials of the problems as a whole, and for indicating the main trend of thought in industries.

The British delegation was small in comparison with many countries, but its members contributed considerably to the discussions, and gave the impression of being fully aware of the limitations of methods and of the need for broad conceptions of principles in applying scientific management to industrial life. Among the delegates were Dr. Miles and Dr. Myers (National Institute of Industrial Psychology), Mr. Hugh Quigley, Mr. L. Davenport (Calico Printers' Association), Mr. R. J. Mackay (Management Research Groups), Mr. K. N. Sloan (Institute of Production Engineers), Mr. Prescott (Federation of British Industries), Mr. Everard Greene (British Tabulating Machine Co.), and Mr. A. G. H. Dent, Chairman of the British Committee for the congress.

The general feeling of the British members was that there would have been more valuable work done from the critical and general experience side if a larger number of British industrialists had been present to take an active interest in the International Congress. There was great value in meeting fellow industrialists from all over the world and exchanging ideas, experience, and methods, and seeing how they were dealing with similar problems. This forming of friends in the industry internationally was a valuable piece of work. International congresses of this kind may be said to be worth while because they bring together industrialist and technician from every country, provide important data for study, and enable useful contacts to be made.

The majority of the twelve questions concerned the production and factory side of management, and only one question dealt specifically with the market. Since market research has become accepted as a technique or method which has definite uses, it was of particular interest to hear the divergent points of view on this problem. Many of the authors of the papers presented were professionally connected with the subject, so that the congress needed the view of business men who had tried out market research. The general conclusion to be drawn from the papers presented was that the work of market research needed men of professional training if it were to be done efficiently. The responsibility of the market study ends with revealing and explaining facts to show what has happened and what may happen; the ultimate action to be taken is the responsibility of the business man.

Co-ordinating Supply and Demand

Both theoretical and practical treatment was given this problem of the study of the market for a product of general consumption. In the course of the discussion Mr. L. Urwick and Mr. A. G. H. Dent emphasised the urgent need for a proper consideration of the great problem of distribution. Mr. Dent pointed out that surplus production capacity in many countries had resulted from the ignoring of consumption and demand by numerous producers. Superficial market studies had been undertaken in certain countries, ignoring the industry as a whole with its many producers; there was a lack of adequate basic statistics. It seemed as though industry in general was suffering from a lack of economic understanding which should be replaced by more fundamental regional and national planning and co-ordination by industries. A big problem was the diversion of the flow of investment to its most effective channels which might be effected through some such body as Mr. McKenna's suggested National Investment Board.

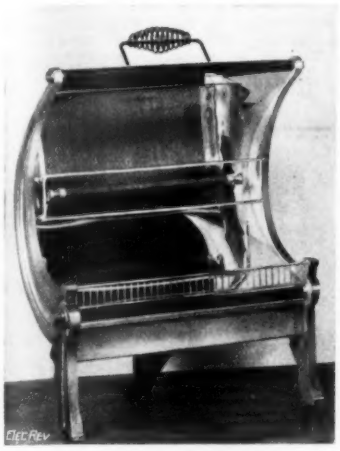
Looking back at the Congress, while its results cannot easily be set down, the exchange of information and the discussions have thrown light on many important problems from important angles, and should lead to useful constructive effort.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Radiant Fires

The new Ferranti "Modera" fires differ from the manufacturers' other models in that they have no side reflectors. An attempt has been made to obtain the widest possible horizontal area of reflection and the side reflectors were considered unnecessary. It is interesting to note that the weight of these models is slightly *more* than those with the reflectors, due to the sturdy construction of the frame.



The "Modera" 2020 fire

Although there is a wide horizontal area of radiation the heat rays are reflected parallel to the ground by the special design of reflector.

Three models have been placed on the market, the one illustrated being type 2020, which is a small 750-W fire, 13¾ in. wide, 8½ in. deep and 16½ in. high, with a weight of 11½ lb. It is priced at £1 15s. The next larger model is loaded at 1,250 W, measures 17¾ in. wide and weighs 2 lb. more. This fire, type 2021, costs 2 guineas.

The largest model is priced at £3 15s. and has two heats with loadings of 1,250 or 2,500 W, and weighs 20 lb. This model, type 2022, is 17¾ in. wide, 10¾ in. deep and 20¼ in. high.

These fires are manufactured by FERRANTI, LTD., Hollinwood, Lancs.

The V.D.S. Radio Valve

The "variable mu" characteristic which has proved to be of such utility in broadcast radio receiver design has been incorporated in a new indirectly heated d.c. screened grid valve developed by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, for mains sets. It is known as the "Osram" V.D.S., and is fitted with the standard type of 0.25-A 16-V filament heater and indirectly heated cathode.

The new valve extends the company's d.c. range, which has hitherto comprised two screened grid valves, two triodes, and a power pentode, and it has been designed to give linear control of volume by variation of grid bias. In addition, the maximum mutual conductance at minimum bias is of a very high order, leading to sensitive reception where it is necessary to use only a single stage of h.f. or l.f.

Where two or more stages of h.f. amplification are employed any tendency to instability due to the high mutual conductance can be checked easily in the "variable mu" type of valve by the simple method of an increase in the fixed portion of the grid-bias resistance. The value of this fixed portion of resistance will limit the maximum conductance to any desired value.

The V.D.S. is designed with a maximum mutual conductance of 2.4 mA per volt, and a grid bias of approximately 40 V; that is, by an increase in grid bias to 40 V the mutual conductance can be reduced to approximately 0.005 mA-volt, thus giving ample range of volume control. The heater cathode insulator withstands up to 110 V, and the circuit arrangements with independent grid bias to each valve are simple.

The "Siroma" Vacuum Cleaner

The "Siroma" cleaner, operated by a 200-W B.T.-H. motor, is claimed to be entirely shock-proof, the motor being insulated from the outer casing, and the aluminium end covers also being bushed with an insulating material. The hose is of rubber with an outside braiding and armoured internally, while the cable is fitted with a universal connector for use with a wall plug or bayonet lamp socket.

The cleaner is fitted with the "Siroma" suction intensifier. The price is 6 gns., and a twelve months' guarantee is given by the suppliers, MESSRS. ARTHUR MORRIS & Co., 46, Commercial St., E.1.

The "Siroma" vacuum cleaner

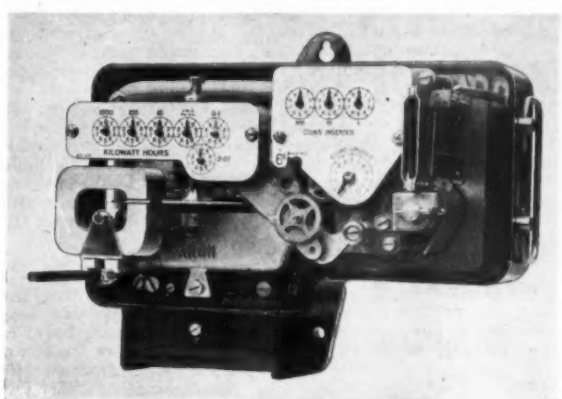
A New Prepayment Meter

The latest Aron product, a prepayment meter known as type "eP," is a companion to the quarterly meter, type "eI."

The cover and base of the new meter are substantial die castings and distortion is claimed to be impossible. The cover is secured by two thumb nuts and carries a heavy steel coin box that slides forward easily for the removal of money. The coin slot and operating handle are in front, the angle through which the handle turns being conveniently small and self-setting. The whole meter weighs only 8¾ lb.

Great care has been taken with regard to the internal accessibility and ease of adjustment. The meter element employed is exactly the same as in the quarterly meter and, fixed in the base by four screws, can be withdrawn with the terminal block as a complete unit. This operation can be carried out without in any way disturbing the prepayment mechanism since this is entirely self-contained and is mounted at the side. The prepayment mechanism can be removed from the base with the same facility as the meter element. Actually it is possible to remove and replace every moving part of the meter element in a few seconds without removing the element from the base or affecting the calibration, and practically every screw in the prepayment mechanism can be removed from the front.

The general layout of the prepayment mechanism is very straightforward, and is merely a simplification of the manufacturers' previous type. The switch employed is of the rotary drum pattern for lighting circuits; an alternative type of a new design will shortly be forthcoming for dealing with heavier currents. The change of price per kWh is easily



The Aron "eP" prepayment meter

accomplished, either by changing a single gear-wheel, or by changing the whole gear unit. The meter is equally adaptable for any change of coin, since the coin slot and operating coin barrel are both adjustable.

The coin slot is carefully shielded to prevent interference with the interior mechanism and a non-return spring gate prevents the coin being withdrawn once it has operated the mechanism. It is manufactured by the ARON ELECTRICAL METER, LTD., 80, Salisbury Road, Kilburn, N.W.6.

Short-wave Radio Adaptors

Short-wave adaptors for use with any type of a.c. mains- or battery-operated radio receiver, except those employing a screen-grid detector valve, are made by BURNE-JONES & Co., LTD., 296, Borough High Street, London, S.E.1. In addition to model "T" for British sets, a new model "TA" has been produced for receivers incorporating American valves. The "Magnum" adaptor consists of a one-valve detector circuit with an adjustable aerial coupler and condenser tuner. The reaction condenser may also be regarded as a volume controller, though judicious manipulation is necessary to avoid distortion.

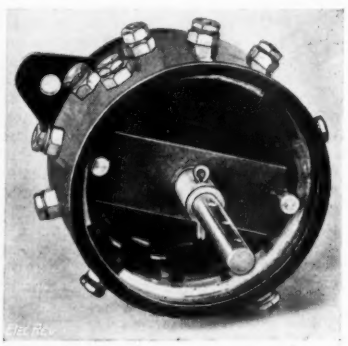
The rectified output from the adaptor is passed to the receiver through a plug which takes the place of the detector valve, so that only the l.f. stages are then utilised (the aerial and earth connections being transferred from the set to the adaptor). In the case of an a.c. set the earth terminals of the set and adaptor must be interconnected

and any valves preceding the detector should remain in circuit to avoid overrunning the others.

The adaptor's normal range is 40 to 80 metres, but other ranges are obtainable by changing the six-pin plug-in coil carrying aerial, grid, and reaction windings. Its dimensions are 10 in. by 4.5 in. by 8in. in height and the price of both models is 39s. 6d., the tuning coils costing 3s. each.

Voltmeter Switches

A new voltmeter switch has been designed by WALTER'S ELECTRICAL MANUFACTURING CO., LTD., Kensaltown Works, Kensal Road, W.10, which is claimed to give almost perfect contact. It has six d.p. ways and can be easily connected up to form a 12-way s.p. switch, and by mounting two bodies in tandem on one spindle it can be used as a 12-way d.p. or 24-way s.p. switch; it is therefore very useful for telephone, telegraph, and wireless circuits.



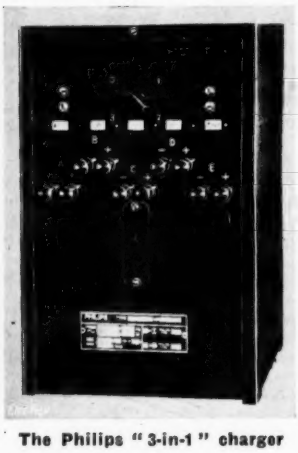
The "Wemco Major" switch with cover removed

The contacts are large and have a break of approximately ½-in.; there is an insulating bridge between each circuit and a damping shield is automatically inserted when changing from one circuit to another, thus allowing the switch to be used on circuits up to 660 V with ½ A current. Each switch is suitable for mounting on the back of panels from 5- to 2-in. thick, and can be supplied with the handle engraved or left blank and mounted with a pointer for use with a dial mounted on the switchboard. This switch, the "Wemco Major," costs 13s.

Another smaller 2-way d.p. voltmeter switch has been designed for front of panel mounting. The contact works independent of the arm, ensuring a good contact even if the arm has become crooked through being screwed up too tight. The brass contacts are fitted into slots and are held in position by two springs moulded in the ebonite, any tilting of the ebonite arm being taken up by the spring. This model is listed at 6s. 6d. (2-way d.p.) and 6s. 9d. (3-way d.p.).

A Philips Battery Charger

While the majority of wireless dealers, garage owners, and others to whom battery charging is a source of income have sufficient technical knowledge to operate a charging board of the usual type, it is well to remember that much of the actual work is performed by non-technical people, and careless or unintelligent handling of the usual type of charging panel, whether the source of supply be rotary convertor or static rectifier, can result in damage both to accumulators and plant.



The Philips "3-in-1" charger

It is with this fact in mind that the new "3-in-1" charger has been produced by PHILIPS INDUSTRIAL, 145, Charing Cross Road, W.C.2. It operates on a.c. mains, and has a maximum charging capacity of 60 2-V cells—well suited to the requirements of the average small charging station, and at the same time a useful accessory to a larger plant. The available d.c. output is 5.5 A at 30 V, the means of rectification being a full-wave gas-filled valve with a 2,500 working hours' guarantee—the average life experienced in practice being considerably greater.

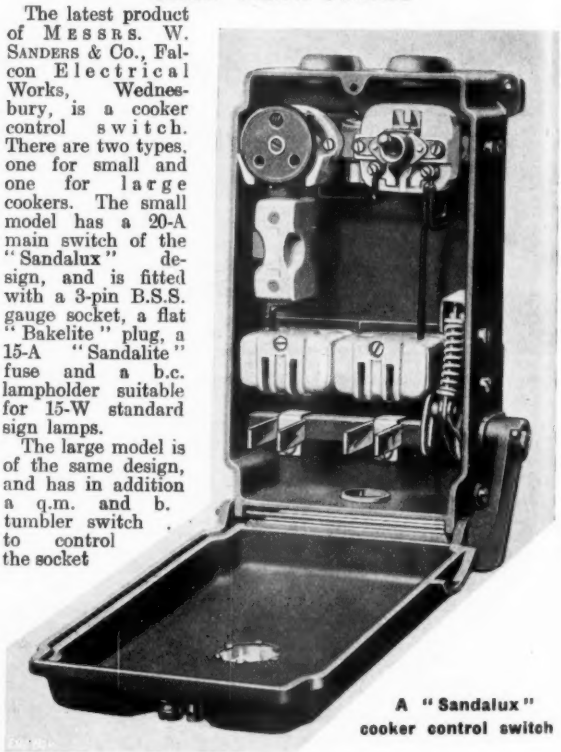
The output from the rectifying valve is split into five circuits. For each circuit a pair of output terminals is provided with the charging rate clearly indicated above them. In series with each circuit is a regulator lamp or "barretter," which acts as an automatic regulator having resistive properties such that a constant current is passed in spite of large variations in the applied voltage; hence any number of cells from one to twelve in series can be connected across any pair of output terminals, and the charging current obtained will be that indicated for the circuit without any adjustment being made. Even if the terminals are short circuited, the current flowing will not be appreciably in excess of the indicated rate.

Most small charging stations deal mainly with radio accumulators requiring ¼, 1 and 2 A, but as larger cells or even starter batteries are sometimes met with a circuit giving 4 A is very desirable. If, however, a fixed 4-A circuit is provided, it absorbs the greater part of the output, and when no large cells are on hand, the only way of utilising it would be by series-parallel connection of smaller cells—a somewhat complicated method for unskilled handling. The scheme adopted for the "3-in-1" was to fix two circuits at 1 A and ¼ A respectively, the other three circuits being connected to a four-position barrel switch. By means of this switch, the available 4-A of output can either be divided between the three circuits or concentrated in one, so that suitable charging rates can be obtained according to the batteries on hand. Furthermore, by means of a rotary disc mounted on the switch spindle, the output available from any circuit at any time is indicated immediately above the terminals.

Cooker Control Switches

The latest product of MESSRS. W. SANDERS & CO., Falcon Electrical Works, Wednesbury, is a cooker control switch. There are two types, one for small and one for large cookers. The small model has a 20-A main switch of the "Sandalux" design, and is fitted with a 3-pin B.S.S. gauge socket, a flat "Bakelite" plug, a 15-A "Sandalite" fuse and a b.c. lampholder suitable for 15-W standard sign lamps.

The large model is of the same design, and has in addition a q.m. and b. tumbler switch to control the socket



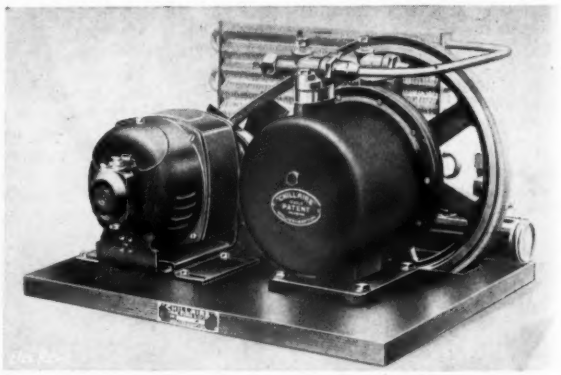
A "Sandalux" cooker control switch

and may have either a 30-A or 60-A main switch. The cable entry is through one bushed hole at the bottom and two at the top. The prices with standard finish are: 20-A main circuit, 13s. 8d.; 30-A, 19s. 8d. and 24s. 8d.; 60-A, 30s. and 36s.

A New Refrigerator

MESSRS. ORME, EVANS & CO., LTD., Wolverhampton, have commenced to manufacture a new refrigerator called the "Chillaire."

This refrigerator, which is all British, is fully automatic in action, and has porcelain on steel both inside and outside. The compressor is of a patent rotary type, running at 300 r.p.m., and there are only three moving parts, which are submerged



The "Chillaire" condensing unit

in an oil bath. The patent double helix evaporator allows active refrigeration to come in both ends of the evaporator coil, and thus provides against the necessity to "de-frost" the apparatus.

The compressor is driven by a ⅛-h.p. motor fitted beneath the food compartment, and is practically noiseless in operation. There are two models which are priced at £80 and £55 respectively.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

The F.B.I. Trade Forecast

The business forecast for the third quarter of 1932, published in the "Business Barometer" of the Federation of British Industries, states that the conversion of the War Loan to a 3½ per cent. basis represents the first major step towards world recovery since the onset of the slump in 1929. Unfortunately, as was the case last year when it was still possible to treat the present slump as a trade cycle depression, events outside this country are likely to continue to hold up recovery. The present depression has passed the stage when it is possible to look for a return to the position in 1929, and the system of "international" trade then operating has collapsed beyond recall. In the United States the policy of credit "reflation" is making industrial and commercial readjustment more difficult and thus postponing still further the day of recovery. The probabilities are that Great Britain's domestic trade will continue substantially unchanged, falling off in one direction being offset by improvement in another, as has been the case in the past year; abroad the situation is on the whole likely to grow worse before there can be any permanent improvement.

The Leipzig Autumn Fair

The Leipzig Autumn Fair, 1932, will be held from August 28th to September 1st. Full particulars regarding exhibits, railway fares, hotel accommodation, &c., may be obtained from the London office of the Fair, 1, Gower Street, W.C.1.

Industrial Design Competition

The exhibition of work submitted for this year's Royal Society of Arts Competition of Industrial Designs was opened last Saturday at the Imperial Institute, South Kensington, S.W.7, and will continue until August 31st. Among the designs of electrical interest are: A neon light display for the exterior of a theatre or cinema, vestibule lighting fittings, street lamp standards, table lamps, radio-gramophone cabinets, and an electrical wiring system.

British Contract for Danish Railways

According to *The Times*, the British Steelwork Association announces that Messrs. John Baker and Bessemer, Ltd., Rotherham, have received an order for wheels and axles for use on the Danish State Railways. These wheels and axles are for use on the new motor-coaches in connection with the electrification of the Danish State Railways, for which British contractors recently secured an order for electric train equipment to cost £300,000.

The Greek Radio Market

A report just issued by the Department of Overseas Trade states that the Greek market will probably offer good opportunities for the sale of radio apparatus in the future.

Rural Electrical Development Propaganda

A publication entitled "Electricity and the Farm" issued last week by the British Electrical Development Association strikes a new note in this class of literature. Page by page it deals with the major applications of electricity to farming and rural industry and each page is well illustrated by telling drawings. In this way lighting, pumping, corn grinding, chaff cutting, threshing, sawing, sheep shearing, milking, the dairy and the farmhouse are treated, brief details of the necessary appliances and the cost of operating them being given in each case. At the end of the brochure there is a list of the members of the Association's Rural and Agricultural Electrification Committee under whose auspices the publication has been prepared. The accompanying typical illustration reproduced from the brochure well exemplifies the labour-saving attributes of electricity applied to a wearisome task.

With the brochure is circulated a reprint in booklet form of Mr. F. E. Rowland's paper on "How Electricity Helps the Farmer" read at the recent Royal Show, Southampton.

Log sawing made easy by electricity

Electrically Equipped Pit-head Baths

Lady Benyon, M.B.E., recently performed the opening ceremony at the new pit-head baths at North Celynen Colliery, Newbridge, which have been constructed at a cost of over £24,000. The electrical work, including lighting, power and ventilation, was carried out by Messrs. A. G. Arnold & Son, of Newport, Mon, with "Henley" wires and cables. The equipment includes one pump motor, two boot cleaning motors and fifteen electric fans in the dirty lockers and clean lockers and the bath house. Altogether eighty lighting points have been wired. Part of the installation was carried out in steel conduit and the remainder in twin and three-core "Henlex" cable with bare earth wire incorporated.

Electrical equipment at pit-head baths

Conditions in Lithuania

A Department of Overseas Trade report (Stationery Office, 1s.) on the economic conditions in Lithuania, states that during the first half of 1931 the country was only slightly influenced by the growing world crisis, but that after July the situation changed considerably. Adverse financial events in other countries led to a run on the local banks, the consequence of which was a rigid restriction of credit, particularly in the import trade. Electrical machinery imports during 1931 amounted to 239.3 metric tons (valued at 1,431,000 lits); the United Kingdom supplies a large portion of the Diesel engines required for power stations and other industrial undertakings. The radio market is practically controlled by Germany and Holland. Survey work is in progress in connection with the erection of a large hydro-electric power station estimated to cost 40 million lits, on the River Niemen, 6 km. from Kovno, but no decision on the question has yet been made by the Government.

The National Display Convention

The eighth National Display Convention arranged by the Guildford and District Display Association is to be held from September 5th to 7th at the Holy Trinity Hall, High Street, Guildford. Particulars may be obtained from Mr. W. R. Palmer, Convention Secretary, Guildford and District Display Association, Playhouse Arcade, High Street, Guildford.

Czecho-Slovakian Electrical Imports

Imports of electrical equipment into Czecho-Slovakia during the first six months of this year amounted to 127 million kr., a decrease of 24 million kr. as compared with the corresponding period of the preceding year.

The British Industries Fair

Applications for space at the British Industries Fair to be held next February are again breaking records and 90 per cent. of the available space at Castle Bromwich has already been disposed of. This year's Fair poster, 70,000 copies of which are being printed for display throughout the world, shows Britannia with upraised forearm silhouetted in white against a deep blue background with " B.I.F., 1933 " in solid lettering of bright red. The Fair's opening date (February 20th) is being added in eight languages for the versions used abroad.

Coal-mining Plant in New Zealand

The Department of Overseas Trade has recently published a report on the market for coal-mining machinery and plant in New Zealand.

New Municipal Showrooms

The Dartford Urban District Council's new electricity showrooms in High Street were opened on July 25th. There is an extensive display of apparatus, including cooking ranges and lamp fittings.

The Malvern Urban District Council has decided to rent premises at 1, The Exchange, for use as electricity and gas showrooms.

The Electricity Commissioners have refused to consent to the proposal of the Bermondsey Electricity Committee to acquire the Royal Oak public house, Union Street, for use as electricity offices and showrooms.

The Gillingham (Kent) Electricity Committee has approved a proposal to erect electricity offices and showrooms to plans prepared by the borough engineer and is considering the site for the buildings.

Great Britain's Radio Exports

The official figures just published show a further expansion in radio exports. For the six months of the current year the total value of wireless goods exported from Great Britain was £558,803, as compared with £469,265 in the corresponding period of 1931. The actual gain is even better than the figures show because the price level is lower this year and the re-exports of foreign goods are much less.

A Prize-winning Carnival Tableau

At trade pageants recently held at Cardiff and Tredegar, the South Wales Electrical Power Distribution Co. was awarded first prizes in each instance for its attractive exhibit. The tableau depicted ancient and modern cookery and was mounted

A " Revo " cooker tableau

on a trailer. To illustrate the ease of modern cooking a large model " Revo " cooker as hired by the company was used in conjunction with the efforts of a child making pastries. This portion of the tableau bore cards on the cooker stating " It's Child's Play Cooking by Electricity," and attention was called to the hiring facilities for cookers and other appliances.

Recent Contracts

Standard Telephones and Cables, Ltd., has received a contract from the Central Electricity Board for the manufacture, supply and installation of 33,000-V cable from Liverpool to Birkenhead through the new Mersey Tunnel. The execution of this contract, which involves supporting two 0.25 sq. in. three-core 33,000-V cables vertically in the staircase shafts at either end of the tunnel and placing the cable on racks on the dividing wall beneath the roadway in the tunnel under the river, will involve some interesting engineering problems, and the Standard Co. working in conjunction with the consulting engineers, Messrs. Kennedy & Donkin, will be carrying out the complete installation within the course of the next few months. The company has also received orders for the provision of pneumatic tubes at Newcastle and Birmingham trunk telephone exchanges from the General Post Office.

The D.P. Battery Co. is engaged at present in the installation of four batteries with a combined capacity of over 25,000 Ah; each is to be installed in duplicate bringing the total capacity to over 50,000 Ah. Other work in hand includes the renewal of two 250-V central station batteries and the installation of forty batteries for one of the principal railway companies. In addition the company has orders for two 5,000-Ah batteries for a telephone exchange in Ireland, and 625 cells (ranging in capacity from 10 to nearly 2,000 Ah) for a new broadcasting station.

The British Thomson-Houston Co., Ltd., has received orders for supplies of " Mazda " lamps from the Union Castle Mail Steamship Co., Ltd., the Great Western Railway, and British Celanese, Ltd.

Siemens Electric Lamps & Supplies, Ltd., has received a repeat order from the Union Castle Mail Steamship Co., Ltd., for six months' supply of vacuum and gasfilled lamps.

The British Electric Transformer Co., Ltd., has received a contract from the Port of London Authority for the supply of " Kye " gasfilled and vacuum lamps.

Australian Companies

The Ducon Condenser Pty., Ltd., 450, Collins Street, Melbourne, has recently been registered in Australia with a capital of £10,000 to manufacture and deal in condensers and general electrical and radio equipment. The capital of Philips Lamps (Australia), Ltd., has been increased from £50,000 to £500,000.

Trade Announcement

The Hart Manufacturing Co. asks us to state that a large amount of correspondence is still being addressed to its old offices. The company's correct address is now Gunnersbury Avenue, Chiswick, W.4.

Argentine Electrical Imports

The Argentine Government has recently issued statistics of the country's foreign trade during 1931. The following table shows either the weights or numbers or the values in gold pesos (about 4s.) of the various descriptions of electrical materials imported in that year, and the figures are compared with those for 1930. The values are those of the Argentine Customs Department.

	1931	Inc. or Dec.
Cables, not covered with lead or silk (metric tons)	1,450	— 1,220
Ditto, lead covered (metric tons)	1,930	— 2,354
Ditto, silk covered (metric tons)	5	— 1
Ditto, duty free (metric tons)	329	— 846
Flex, electric (metric tons)	65	— 15
Dynamos and motors (metric tons)	3,670	— 1,990
Fan motors (number)	15,290	— 21,400
Accumulators and accessories (metric tons)	2,296	— 2,382
Dry batteries (metric tons)	2,115	— 1,468
Ammeters and voltmeters (number)	7,350	— 2,294
Wireless telephone apparatus (gold pesos, 000)	2,410	+ 980
Wireless telegraph apparatus (gold pesos, 000)	—	— 3
Other telephone material and apparatus (gold pesos, 000)	460	— 340
Other telegraph material and apparatus (gold pesos, 000)	18	— 68
Switches, cut-outs, circuit breakers, etc., entered by weight (metric tons)	477	— 98
Switches (entered by number) (gold pesos, 000)	59	+ 39
Electric bells (gold pesos, 000)	62	+ 5
Insulating tape (metric tons)	103	— 5
Switchboards for bells and telephones (gold pesos, 000)	10	— 7
Vulcanised fibre (gold pesos, 000)	29	— 8
Incandescent lamps (metric tons)	567	— 223
Meters (number)	1,930	— 4,280
Distribution boards (number)	540	— 440
Insulating tubes (metric tons)	3,070	— 1,310
Unspecified materials (gold pesos, 000)	1,460	— 168
Insulators, glass (metric tons)	102	— 188
Insulators, porcelain, etc. (metric tons)	560	— 506

Italian Electrical Imports

The imports of electrical machinery, apparatus, and cognate material into Italy during the four months ended with April last had a value of £684,550 as compared with £1,242,735 in the corresponding period of 1931. On the other hand, the exports of similar material from Italy during the same period increased from £377,325 to £567,775.

" Underground " Employés' Wages

It is reported that all but one of the unions representing the craftsmen employed by the Underground Railway Companies have accepted the proposals for a reduction in wages and salaries. The Union which has not yet given its decision is the Electrical Trades Union, which is holding a meeting to-day (Friday) to consider the proposals.

Electrical Equipment Production in Russia

The output of electrical equipment in the Soviet Union during the first five months of 1932 was valued at 309,613,000 roubles, the plan for this period having been carried out to the extent of over 90 per cent. As compared with the corresponding months of 1931, the output shows an increase of nearly 48 per cent.

A French Amalgamation

The Société Générale de Constructions Electriques et Mécaniques (Alsthom), which is a subsidiary of the French Thomson-Houston Company and the Société Alsacienne de Constructions Mécaniques, is now absorbing the Société des Constructions Electriques de France, of which it already held the majority of the shares. The object of the amalgamation is to effect economies in working.

For Sale

Manchester Electricity Department has second-hand plant for disposal.

(See our advertisement pages to-day.)

The Chloride Company's Sports

The Chloride Electrical Storage Co., Ltd., held its annual sports and gala at the "Exide" sports ground at Clifton Junction on July 16th. Among the 600 people present were Mr. W. S. Naylor, managing director of the company and chairman of the recreation club; Mr. A. W. Browne, general manager; Mr. E. C. McKinnon, chief engineer; Dr. Lane, works doctor; Mr. C. M. Mills, secretary, and Mr. Lumb, dental surgeon. The most successful competitor was Miss G.

"Exide" ladies on the mark

Williams, of the Accounts Department, who won three first prizes. In the men's invitation relay race the company's team was successful, while the Macintosh Sports Club was successful in the ladies' event. During the afternoon athletic displays were given by the Manchester Ladies and Bolton Lads Athletic Clubs. In the evening a seven-a-side hockey tournament was played, Chloride ladies beating Ermen and Roby's in the final.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, Etc.	Price Aug. 3rd.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£40	—
a Ammonia, Muriate (large crystal) ... ,,	£38	—
a Borax ... ... ,,	£17	—
a Copper Sulphate ... ... ,,	£17	—
a Potash, Chlorate ... ... per lb.	3¾d. to 4¼d.	—
a ,, Perchlorate ... ... ,,	5¼d.	—
a Shellac T.N. ... ... per cwt.	£3 15s.	—
a Sulphur Commercial ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda, Chlorate... ... ... per lb.	3¼d. to 3¾d.	—
a ,, Crystals... ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d.	—
METALS, Etc		
b Aluminium, Ingots ... ... per ton	£95 to £100	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil ... ... ,,	1/1½ to 2/9	—
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£120	—
Grade II ... ... ,,	£85	—
Grade III ... ... ,,	£48	—
c Brass (rolled metal 2" to 12" basis)... per lb.	6½d.	—
c ,, Tubes (solid drawn) ... ... ,,	8¼d. to 9d.	—
c ,, Wire, basis ... ... ,,	7d.	¼d. dec.
c Copper Tubes (solid drawn) ... ... ,,	9¼d.	—
c ,, Bars best selected) ... ... per ton	£57	
c ,, Sheet ... ... ,,	£57	£2 dec.
c ,, Rod ... ... ,,	£57	
c ,, (Electrolytic) Bars ... ... ,,	£36 5s.	—
d ,, ,, Sheets... ... ,,	£34	—
d ,, ,, Wire Rods ... ,,	£36	—
d ,, ,, H.C. Wire ... per lb.	5⅜d.	¼d. dec.
Ebonite Rod ... ... ,,	1/3 to 1/6	—
,, Sheet ... ... ,,	1/3 to 1/6	—
n German Silver Wire ... ... ,,	2/2	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para fine ... ... ,,	4d.	¼d. inc.
i Iron, Pig (Cleveland No. 3) ... ... per ton	58/6	—
i ,, Wire, galve. No. 1, P.O. qual. ,,	£20	—
g Lead, English pig ... ... ,,	£12 5s.	£1 inc.
g Mercury ... ... per bot.	£9 15s. to £10	£1 5s. dec.
e Mica in original cases) small ... per lb.	6d. to 8/6	—
e ,, ,, medium ... ,,	4/- to 8/-	—
e ,, ,, large ... ,,	8/6 to 17/6 & up	—
p Phosphor Bronze, plain castings ... ,,	1/1d.	—
p ,, ,, drawn bars & rods ,,	10¾d.	—
p ,, ,, rolled strip & sheet ,,	10¼d.	—
p ,, ,, wire ... ... ,,	11¼d.	—
e Platinum ... ... per oz.	£9 15s.	—
d Silicium Bronze Wire... ... ... per lb.	7¾d.	¼d. inc.
r Steel, magnet, in bars ... ... ,,	7¾d.	—
g Tin, Block (English) ... ... per ton	£134 10s. to £136 10s.	£6 15s. inc.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	3/1	—

Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Boiling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co.
p C. Clifford & Son, Ltd.
r W. F. Dennis & Co.

New Catalogues and Lists

British Insulated Cables, Ltd., Prescot, Lancs.—Folder No. P.F. 98, dealing with the "B.I. Helsby (1932)," mine exploder. Also a circular relating to B.I. enamelled wires.

Drayton Regulator & Instrument Co., Ltd., West Drayton, Middlesex.—Leaflets, illustrating and describing the "Drayton V.T." automatic temperature regulator.

Herbert Terry & Sons, Ltd., Redditch.—An 80-page illustrated catalogue of springs, presswork, wirework, electric grinding outfits, &c.

Thames Electric Co., Ltd., 11, St. James Road, Kingston-on-Thames.—A price list of cables, switchgear, and general electrical accessories.

English Electric Co., Ltd., Stafford.—A leaflet (No. N.72) describing in detail the company's 1- and 2-kW fires.

Philips Industrial, 145, Charing Cross Road, W.C.2.—An illustrated booklet giving brief particulars of the company's wide range of oxide cathode rectifiers.

Vickers, Ltd., Broadway, S.W.1.—A publication setting forth the extensive interests of Messrs. Vickers, Ltd., and their subsidiary companies.

Newton & Wright, Ltd., 471-473, Hornsey Road, N.19.—Publication No. P/32 on diathermy apparatus (surgery and treatment).

Ever Ready Co. (Great Britain), Ltd., Hercules Place, Holloway, N.7.—A coloured catalogue of torches, pocket and cycle lamps, &c. The leaflets comprising the catalogue can be supplied separately for counter distribution.

Elliott Brothers (London), Ltd., Century Works, Lewisham, S.E.13.—Catalogue sheet No. G.29, describing the company's new portable power factor finder and circuit analyser.

A. Reyrolle & Co., Ltd., Hebburn-on-Tyne.—Pamphlet No. 849, describing the company's electric oil-heating equipment.

Marconiphone Co., Ltd., 210-212, Tottenham Court Road, W.1. —Particulars of the company's 1933 models and a sales programme.

Cambridge Instrument Co., Ltd., 45, Grosvenor Place, S.W.1. —List No. 152A, giving a detailed description of the latest forms of "Cambridge" draught and pressure gauges and recorders.

M. & C. Switchgear, Ltd., Kelvinside, Works, Kirkintilloch, Glasgow.—Pamphlets R.41/1 and K.112/19, dealing respectively with a.c. motor starting gear and gate-end switching.

Victor H. Iddon, Ltd., 27, Blackfriars Street, Manchester.—A catalogue of "Nettle" quick-wiring accessories, including a new Home Office switch holder with circular cord grip, and a new pear switch.

Stonebridge Electrical Co., Ltd., Victoria Road, W.3.—A booklet dealing with time switches.

Bankruptcy Proceedings

A. H. Smith and **L. Smith** (trading as "Smiths"), wireless dealers, &c., 77, Market Street, Hindley, Lancs.—The public examination was recently held at the Court House, Crawford Street, Wigan. The joint statement of affairs submitted disclosed liabilities of £2,016, with assets of £787, leaving a deficiency of £1,229. The separate estate of A. H. Smith showed no secured liabilities, and assets estimated to realise £20. The failure was attributed to "lack of capital, keen competition, allowing too much credit, and inability to obtain prompt payment of the hire-purchase instalments owing to unemployment and trade depression." Mrs. L. Smith stated that her estate showed assets of £295, and no unsecured liabilities. The examination was closed.

A. Prosper, electrical engineer, 4, Oak Tree Villas, Green Lanes, Palmers Green, Middlesex.—The receiving order was made recently on the debtor's own petition, and the statement of affairs filed shows liabilities of £858, and assets of £13, leaving a deficiency of £845. The position is attributed to commencing business without capital, trade depression, and underestimating on contract work. At the first meeting of creditors, held recently, the case, being a summary one, was left in the hands of the Official Receiver as trustee.

W. J. R. Ashley (trading as Southern Wireless Services), wireless and electrical engineer, 151, London Road, North End, Portsmouth, and Warflete, Auckland Road West, Southsea. The receiving order was made on the debtor's own petition. The first meeting of creditors was held recently at the Official Receiver's Office, 87, High Street, Portsmouth. According to the statement of affairs submitted, there were liabilities of £720, and assets of £82. The case, being a summary one, was left in the hands of the Official Receiver as trustee.

D. C. Bailey, wireless dealer, 22, Doncaster Road, Barnsley. —The public examination was held on July 28th at the County Court Hall, Barnsley, when the statement of affairs showed liabilities of £1,365, and a deficiency of £964. The examination was closed.

A. M. Hyde, electrical and radio engineer, 4, Duke Street, Congleton.—Last day for receiving proofs for dividend, August 11th. Trustee, Mr. P. M. Milward, 12, Lonsdale Street, Stoke-upon-Trent, Official Receiver.

R. J. C. E. Lovelock, electrician, 36, Sirdar Road, Portswood, Southampton.—First and final dividend of 2s. 2d. in the £, payable August 6th, at the Official Receiver's office, Midland Bank Chambers, High Street, Southampton.

W. J. Holyoake, electrical engineer and wireless dealer, 2, Scott's Mansions, Claremont Hill, Shrewsbury.—The public examination was held recently, at the Shire Hall, Shrewsbury. The statement of affairs showed liabilities of £286 and assets of £156, leaving a deficiency of £130. The position was attributed to bad trade and the examination was closed.

E. D. Newcombe (B. Newcombe), wireless engineer, 6, Rainsford Road, Chelmsford.—Last day for receiving proofs for dividend August 12th. Trustee, Mr. J. L. Poland, 29, Russell Square, W.C.

P. H. Fawbert, wireless dealer, 81, Dickson Road, Blackpool. —First and final dividend of 2s. 2¼d. in the £, payable August 5th, at the Official Receiver's office, 9, Cannon Street, Preston.

W. A. Taskes, dealer in wireless apparatus, 5, Chapel Road, Church Town, St. Just in Penwith, Cornwall.—First and final dividend of 4s. 5d. in the £, payable August 2nd, at the Official Receiver's offices, 12, Princess Street, Truro.

Company Liquidations

Bullphone, Ltd., manufacturers of and dealers in wireless and electrical components and accessories, Nightingale Works, New North Road, Barkingside, Essex.—Under a winding-up order made on June 27th on a creditor's petition the statutory meetings of creditors and shareholders were held on July 28th at the Board of Trade Offices, W.C. Mr. H. P. Naunton, Assistant Official Receiver, presided, and said that in May last a number of writs had been issued against the company and the debenture interest was in arrears, and accordingly, under the powers contained in her debentures, Mrs. Bullen on May 27th appointed Mr. V. I. Bell, 27-28, Old Jewry, City, as receiver and manager; he had reported that he had effected a sale of the business by private treaty for £1,500 and had made other realisations amounting to £306. He anticipated receiving a further £80 from book debts. In those circumstances there was no likelihood of a surplus becoming available for distribution among the unsecured creditors. Bullen attributed the failure of the company to the falling off of business, keen competition, and slump in the wireless trade. According to the statement of affairs which showed the position as at the date of the appointment of the receiver for the debenture holder, the gross liabilities amounted to £9,132, of which £5,807 was due to 102 unsecured creditors and £6,797 was expected to rank. The assets, which were valued at £2,334, were absorbed by the payment of preferential claims and payment in part of that of the debenture holder amounting to £3,253. A total deficiency of £7,797 was shown in relation to the shareholders. A resolution was passed for the appointment of Sir Leonard Coates as liquidator.

Warnes & Dust, Ltd., wireless set manufacturers, 10, D'Arblay Street, W.1.—The statutory meeting of creditors was held recently, when a statement of affairs was submitted which disclosed liabilities of £751. The assets were estimated to realise £212, from which had to be deducted preferential claims of £19, leaving net assets of £193, or a deficiency of £558. A resolution was passed appointing Mr. H. H. Shipley, 98, St. Martin's Lane, W.C., as liquidator.

Radios Electrical, Ltd., wireless and electrical dealers, 8, Malden Road, New Malden, Surrey.—A meeting of the creditors was held recently, when it was stated that the liabilities amounted to £799, all due to unsecured creditors, and net assets to £157, leaving a deficiency of £642. A resolution was passed appointing Mr. C. Latham, of the Wireless and Allied Trades Guardian Association, 78, New Oxford Street, W., as liquidator, with a committee of inspection consisting of the representatives of three of the creditors.

Wallage & Sons, Ltd.—Meetings September 2nd at 6 and 7, Old Steine, Brighton, to receive an account of the winding-up by the liquidator, Mr. A. E. Orbell.

Mason (Electro-Medical), Ltd.—Meetings September 7th at 24, Essex Street, W.C., to receive an account of the winding-up by the liquidator, Mr. H. A. Snelling.

Wark & District Electric Lighting Co., Ltd.—Winding up voluntarily. Liquidator, Mr. W. Patterson, Hexham.

Dissolutions of Partnership

Regent Radio Supply Co., manufacturers of radio instruments and components, 24, Bartletts Buildings, Holborn Circus, E.C.—Messrs. R. H. Nunn and A. L. Hodley have dissolved partnership. Mr. Nunn will attend to debts and carry on the business.

R. W. Simpson & Co., electrical contractors and radio engineers, 433, Dudley Road, Wolverhampton.—Messrs. E. J. Nicholls and R. W. Simpson have dissolved partnership. Mr. Nicholls will attend to debts and carry on the business.

F. B. Cash, wireless leaders and electrical engineers, 487, Garratt Lane, Earlsfield.—Messrs. F. B. Cash and W. J. Baston have dissolved partnership. Mr. Cash will attend to debts and carry on the business.

Mick-Electric, wireless and electrical engineers, 413, Fulham Palace Road, Fulham, S.W.—Messrs. O. R. Cromarty, H. C. Tillotson, and C. E. E. Miles have dissolved partnership. Messrs. Cromarty & Tillotson will attend to debts and carry on the business.

Private Arrangements

M. Landau, wireless and electrical dealers, &c., 66-70, High Street, Camden Town, N.W.1.—A meeting of creditors was held recently at Winchester House, E.C., when the representative of the Gramophone Co., Ltd., occupied the chair. A statement of affairs prepared by Messrs. Percy Mason & Co., 64, Gresham Street, E.C.2, was submitted, which disclosed liabilities of £13,181, of which £8,330 was due to trade creditors. In addition there were fully secured creditors for £9,020, holding securities valued at £14,150. The total assets amounted to £9,509, from which had to be deducted preferential claims of £165, leaving net assets of £9,344, or a deficiency of £3,837. It was stated that there had been a previous meeting of creditors, when a committee was appointed which considered that an offer of not less than 10s. in the £ should be paid. In order to protect the assets a deed of assignment had been executed and as the debtor's solicitor could not offer a composition of 10s. in the £ the meeting terminated without any definite resolutions being passed. The following are the principal creditors:—Columbia Graphophone Co., Ltd., £474; Decca Record Co., Ltd., £584; Electric Lamp Service Co., Ltd., £242; Falk, Stadelmann & Co., Ltd., £219; Gramophone Co., Ltd., £1,018; Impex Electrical, Ltd., £477; Itonia, Ltd., £608; Johnson Talking Machine Co., Ltd., £463; Lugton & Co., Ltd., £456; Portable Electric Light Co., Ltd., £240; Thompson, Diamond & Butcher, Ltd., £979; and Zeitlin & Sons, Ltd., £259.

Zelco, Ltd., electrical importers, 53, Farringdon Road, E.C.1.—A meeting of the creditors was held recently at the offices of Messrs. E. W. Long & Co., 27, Lincoln's Inn Fields, W.C., for the purpose of considering a scheme of arrangement proposed to be made between the company and the unsecured creditors. The scheme provided for the payment of 5s. in the £. Mr. Long said that proxies had been lodged by creditors who were in favour of accepting the scheme amounting to £1,650, while the value of the proxies filed against the scheme was £103. The creditors present were in favour of accepting the scheme.

Electricity Supply

Lighting, Domestic, Power

Abertillery.—YEAR'S WORKING.—A net profit of £1,104 was earned by the Urban District Council's electricity undertaking last year, a decrease of £316 as compared with the previous year.

Aldershot.—PROPOSED PRICE REDUCTIONS.—The Town Council is recommended by the Electricity Committee to reduce the flat rate for lighting from 6d. to 5½d. per kWh, and for prepayment consumers from 8d. to 7½d. A two-part tariff is also suggested, based on floor space, with a "unit" charge of 1d. The proposed charges would come into force at the Christmas quarter.

Australia.—RURAL ELECTRIFICATION IN VICTORIA.—Speaking at a recent luncheon in Melbourne, Mr. F. W. Clements, chairman of the Victorian Electricity Commission, said that the Commission was looking forward to extending its activities widely in the country districts. On a recent visit to various parts of the State he had been encouraged by the way in which country people were using electricity wherever it was available. Electricity was already very cheap in Victoria, and the continual increase in consumption would make it cheaper still before long.

Barking.—REDUCED CHARGES.—The Electricity Committee recommends reductions in charges as follows:—Power: After the first 3,000 kWh in each quarter, a reduction from 1½d. to 1d. per kWh. Two-part tariff: A reduction of ½d. per kWh. Lighting: Instead of the existing charge of 4½d. per kWh for the first 50 kWh per quarter, and the balance at 4d. per kWh, a flat rate of 4d. per kWh. Becontree slot meter rate: From 2d. to 1½d. per kWh. Street lighting: A reduction of 10 per cent., no rent being charged for meters installed to meet the Corporation's requirements.

YEAR'S WORKING.—There was a net profit of £10,227 on the electricity undertaking last year.

Barrow-in-Furness.—SUPPLY TO CARTMELL.—The Electricity Committee has obtained sanction to a loan of £1,600 for mains and services in connection with the supply to Cartmell, &c.

Blackburn.—SPECIAL ORDER.—The Corporation has applied to the Electricity Commissioners for a Special Order authorising it to extend its area of supply to include Balderstone, Mellor, Osbaldeston, Salesbury and Tockholes.

Canada.—THE ABITIBI DEVELOPMENT.—An important stage in the Abitibi Canyon development of the Ontario Power Service Corporation was reached recently, when the dam received a water test for the first time since its construction began in April last year. The site of the new dam, which will provide a head of about 237 ft., is on the lower Abitibi River, north of Cochrane, and the plant has been designed for five units of 66,000 h.p. each. The first power from the new development is scheduled to be delivered by October 1st this year.

INCREASE IN POWER CONSUMPTION.—The steady increase in the use of water power in Canada is shown by a comparison of the figures for 1920 and 1931 issued by the Dominion Water Power and Hydrometric Bureau. During this period the amount of power used per 100 of population increased from 31 to 64 h.p.

THE ST. LAWRENCE SCHEME.—An agreement has been entered into between the Dominion Government and the Provincial Government of Ontario under which the latter will be given the right to the power developed on the international section of the St. Lawrence waterways. The cost of the work solely for power development will be assumed by Ontario.

Cardiff.—CHEAPER ELECTRICITY.—The following reductions in electricity charges are proposed by the Electricity Committee: Late shop window lighting, from 1½d. to 1d. per kWh. Heating, from ¾d. to ⅝d. in the summer quarters, the winter charge remaining unchanged. Cooking, from ¾d. to ⅝d. Power (flat rate), from 1⅞d. to 1d. Power (maximum demand), from 1⅞d. and ⅝d. to 1d. and ½d. Similar reductions are contemplated in l.p. and e.h.p. bulk supplies and in special flat-rate charges, and it is also proposed to introduce a lighting block tariff as follows: First 5,000 kWh per annum, 3½d. per kWh; next 10,000 kWh, 3d.; next 10,000 kWh, 2½d.; all above 25,000 kWh, 2d.

Clitheroe.—BOWLAND APPROVES CORPORATION'S EXTENSIONS.—The Bowland Rural District Council has given formal consent to the Corporation's Rural Electricity Extension Order.

Cockermouth (Cumberland).—THE ELECTRICITY SCHEME.—It was reported at a meeting of the Rural District Council that the Mid-Cumberland Electricity Co. was prepared to proceed with the electricity scheme for the area, but that the company had received a communication from the County Council saying that it intended to object to overhead lines in villages having over a certain density of population. It was decided to send a letter of protest to the County Council and also to write to the Ministry of Transport to the effect that the question of the delay in the erection of the sub-station at Stainburn should be gone into.

Coniston (Lancs).—SUPPLY FROM BARROW.—The Electricity supply to Coniston now comes from the Barrow Corporation and has been changed over from d.c. to a.c.

Continental.—FRANCE.—Up to 1923, the post-War reconstruction of electrical generating and distributing systems in Northern France was largely confined to the big towns and villages. The question of supplying the rural areas, representing about 50 per cent. of the communes, was then considered. Considerable difficulties were encountered, chiefly in the large initial cost and the small possibility of profitable returns. One of the first steps taken by the State to aid rural electrification was the granting, by the Ministry of Agriculture, of subsidies to distributing corporations of portions of the initial expenses, reaching as much as 50 per cent. of the outlay. The communes were permitted to borrow up to two-thirds of the remainder from the State "Crédit Agricoles," or agricultural credit funds, at 3 per cent. interest, the remaining one-third having to be furnished by agricultural societies, or by the communes. It was found, in general, that the distributing companies desired to charge rates for supply which were considered prohibitive by the communal authorities, but agreements were eventually made whereby the charges for supply in outlying rural districts were not to exceed the maximum rates in other parts of the territory. It is estimated that a total of about 250,000,000 fr. has thus far been spent on rural electrification in Northern France.

RUSSIA.—Work is in progress on the establishment of a hydro-electric plant in the Republic of Daghestan in South-eastern Russia to utilise the water power of the Samour. The plant will be capable of a continuous output of 150,000 kW, which will be used in the Baku and Gronyi oil-producing centres. A second but smaller hydro-electric plant (6,000 h.p.) is also being established at Gergebil to utilise the power of the River Karakoissou.

Crayford (Kent).—CHEAPER ELECTRICITY.—The West Kent Electric Co., Ltd., has reduced its charges in the Crayford area as follows: Lighting, flat rate, from 7d. to 6d. per kWh. Under the domestic and business "all-in" two-part tariffs, a reduction is to be made in the "unit" charge from 1½d. to 1d.

Croydon.—MAINS EXTENSIONS.—Mains extensions are to be carried out by the Electricity Committee in Mitcham Road at an estimated cost of £1,530.

Dover.—BULK SUPPLY.—The Town Council has decided to take a bulk supply of electricity and has declined to allow any further negotiations to proceed to obtain a lower price.

Guernsey.—STATES PURCHASE UNDERTAKING.—The States of Guernsey have agreed to purchase the electric lighting and power concession from the Guernsey Electric Light Co. A definite purchase price has not been settled, but it is believed that it will be between £250,000 and £270,000. The concession was granted to the power company (of which Edmundson's Electricity Corporation is the parent company) under an Order-in-Council of 1898, and was due to expire on August 6th of this year. The States were previously asked either to adopt the recommendations of their Board of Administration to approve an agreement drawn up between the Board and the company, or to authorise the Board to give the company notice to cede the concession; or, further, to allow the existing concession to continue, but to authorise the Board to go to arbitration on the revision of the tariff of charges. It is expected that the money for the purchase will be raised by public loan.

Irish Free State.—REDUCED COOKING CHARGES.—The Electricity Supply Board, on and after September 1st next, is reducing the cost of electricity for cooking purposes to 1d. per kWh in all cases where the present rate exceeds that amount.

London.—POPLAR.—The Electricity Committee is to renew feeder and section pillars at a cost of £568, and replace ammeters at sub-stations at a cost of £244.

The Baths Committee has asked the borough electrical engineer to rewire the Bromley public hall at a cost of £170.

Machynlleth (Mont.).—SPECIAL ORDER.—The Urban District Council has given its consent to the application by the newly formed electricity company for a Special Order to supply electricity to the town.

Mansfield.—NEW H.P. FEEDER.—The Electricity Committee is to lay a h.p. feeder at Mansfield Woodhouse at a cost of £1,000.

YEAR'S WORKING.—A surplus of £5,473 is reported on the past year's operation of the electricity undertaking.

Northern Ireland.—BALLYMENA.—At a special meeting of the Urban Council last week the proposed sale of the electricity undertaking to the Antrim Electricity Supply Co. was discussed. The chief question was that of overhead wires, to which a large number of residents objected. The sale of the undertaking was finally authorised subject to the amenities of the town being preserved by the purchasing company.

North Tawton (Devon).—STREET LIGHTING.—The Parish Council has accepted the tender of the local electricity supply company for public lighting for a period of ten years.

Oban.—EXTENSIONS.—At a cost of £28,000, the Town Council is to extend its existing electricity undertaking, and the Electricity Commission is to be asked for sanction to install additional plant and to borrow the money necessary to carry out the scheme.

Retford.—LOANS.—The Town Council has applied for sanction to loans of £348 for transformers, £14,147 for mains and services, £1,472 for meters, £1,654 for public lighting, and £2,878 for free wiring.

Scarborough.—LOANS SANCTIONED.—Sanction has been received to loans of £10,000 for meters and £7,500 in connection with the change-over.

Sheffield.—GAS *versus* ELECTRICITY.—At the request of the City Council the Watch Committee has prepared a report on street lighting by gas and electricity. The Committee thinks that the use of gas should not be abandoned, but that electricity should be used to a greater extent for street lighting. It considers that the Council should do what it can to "promote a rivalry between the two undertakings to secure the best results at the lowest cost." While in August, 1924, there were in the city streets 11,438 gas and 290 electric lamps, in April, 1932, the number of electric lamps had increased to 4,530, and with one exception the streets of all the new housing estates are electrically lighted.

DISPOSAL OF PROFITS.—The Corporation is applying for permission to allocate from the year's surplus £38,000 for meters, current transformers and wiring installations, and £2,000 for sub-station sites.

An evening picture of Weymouth Bay, which has recently been provided with a system of decorative lighting by Beeantee Illuminations, Ltd.

South Africa.—GRAHAMSTOWN EXTENSIONS.—The Grahamstown Municipality has received permission to call for tenders for the extension of the electricity undertaking for submission to the Electricity Commission and the executive of the Cape Provincial Administration.

South Shields.—ASSISTED WIRING.—The Electricity Committee recommends that the Council shall apply for sanction to borrow £3,000 for its assisted wiring scheme.

Torrington.—PUBLIC LIGHTING.—The Town Council has accepted the tender of the Bideford & District Electricity Supply Co. for public lighting for five years.

West Bromwich.—YEAR'S WORKING.—The Electricity Committee reports a total income for the past year of £106,505, as compared with £107,107 in the previous year, and a net profit of £5,472, as against £4,875. Electricity sold increased from 17,440,429 to 17,496,701 kWh.

Wolverhampton.—SWITCHBOARD ALTERATIONS.—The Electricity Committee has approved a scheme costing approximately £77,528 for changing the switchboard at the Commercial Road sub-station and modifying switchgear in other sub-stations to meet the new conditions when the system is connected to the grid.

INTERCONNECTIONS.—The Electricity Committee is to apply for sanction to a loan of £3,800 for connecting up existing plant in the parish of Upper Penn and the plant to be acquired from the Midland Electric Corporation for Power Distribution, Ltd.

Worthing.—MAINS AND SERVICES.—The Electricity Committee is applying for sanction to a loan of £20,000 for mains and services.

Traction

Bolton.—THE BROWNLOW FOLD ROUTE.—The resolution of the Transport Committee to substitute buses for the Brownlow Fold tramcars was carried a step farther on July 27th, when the Committee decided to operate the Lowther Street and Church Road bus services as a through route.

Bournemouth.—CHEAPER ELECTRICITY FOR TRAMS.—The Town Council has accepted revised terms offered by the Bournemouth and Poole Electricity Supply Co., Ltd., for electricity for the tramways which, it is estimated, will effect a saving to the Corporation of about £2,000 per annum.

Derby.—ANOTHER TROLLEY-BUS SERVICE.—Trolley-buses have now been substituted for trams on the Alvaston-Keddleston Road service. The Osmaston Road route is the next to be converted to trolley-bus operation, and nine further vehicles have been ordered for use on this service, which will probably be opened in November.

Leeds.—AN EXPERIMENTAL TRAMCAR.—The Tramways Committee is to make arrangements for the purchase of an eight-wheel bogie tramcar costing not more than £3,000 for experimental purposes.

London.—UNDERGROUND EXTENSIONS.—It is expected that Manor House, the first of the new stations of the Finsbury Park-Cockfosters underground extension will be opened on September 19th.

SELF-OPERATING TRAFFIC SIGNALS FOR LUDGATE CIRCUS.—The introduction of entirely automatic traffic control signals at Ludgate Circus is contemplated by the police authorities. At present a police officer operates the signals from a glass-panelled box.

Norwich.—PURCHASE OF TRAMWAY UNDERTAKING.—The Corporation has decided to purchase the tramway undertaking from the Norwich Electric Tramway Co. for £175,000 and gradually replace the trams by buses.

South Shields.—REVISION OF FARES.—The Tramways Committee has decided to discontinue the twopenny fare on several routes and substitute a three-halfpenny fare.

Wombwell.—SALE OF TRAMWAY UNDERTAKING.—The Urban District Council has approved the draft agreement under which the Yorkshire Traction Co. is to relieve the local authorities of the Dearne Valley of their responsibilities for the management of the Dearne District Light Railway. Omnibus services are to be substituted for the existing trams.

Communications

Australia.—WIRELESS LICENCES.—At the end of May the total number of wireless licences in the Commonwealth was 363,772, an increase of 6,339 as compared with April. Of the total, 139,397 are held in the State of Victoria and 138,329 in New South Wales.

Belgium.—COMMON WAVELENGTHS.—The Consultative Broadcasting Commission has decided upon the use of five international common waves between 200 and 207 metres for the simultaneous operation of six or seven 50-W stations before sunset and five stations of the same power after sunset, without guaranteeing non-interference with foreign stations using the same wavelength. When the Commission was established there were twenty-eight private transmitting stations in Belgium; all the unauthorised ones have since been closed.

Cardiff.—LOUDSPEAKER BYLAW.—A bylaw recently made by the Cardiff City Council prohibits the "operation in or in connection with" any shop, business premises, or other place, adjoining a street or public place, of any loudspeaker or gramophone in such a manner as to cause annoyance.

China.—RADIO BEACONS.—Following the successful operation of the Marconi automatic wireless beacon station which was installed in 1930 at North Saddle Island near Shanghai, the Chinese authorities have arranged to equip two other important navigational points with similar apparatus of the latest type. The sites of the new beacons will be at Shaweishan Island, near the mouth of the Yang-tse-Kiang, and Gutzlaff, also on the important shipping routes to Shanghai and the Yang-tse-Kiang, which will be fitted with beacons of 700-W and 500-W power respectively. The apparatus will be specially designed and constructed for use under tropical conditions. Automatic beacons transmit omni-directional signals, enabling ships fitted with direction finders to take bearings. A master clock switches on the transmitting apparatus at predetermined times, after which the plant shuts down until the next call is again automatically transmitted.

Denmark.—TELEPHONY.—The Danish telephone system is one of the best developed in the world, its ratio of 9.9 telephones per 100 inhabitants being the highest in Europe; the only countries in the world exceeding this figure are the United States, Canada, and New Zealand. The network comprises a Government system under the direction of the Ministry of Public Works, and the systems controlled by seven private companies. The private lines cover most of the country, the southern part of Jutland being the only district reserved for State telephones. At the time of the last report, the line length totalled 963,929 miles, an increase of 65,645 miles in twelve months. There are 1,831 exchanges, of which 1,734 are operated by private companies. Subscribers totalled 295,341, of which the private companies had 284,981, and the State system 10,360. While the private companies almost exclusively use apparatus of Danish manufacture, the State-controlled concern purchases for the most part Swedish apparatus. The most important single unit is the Copenhagen Telephone Company, which controls slightly over 50 per cent. of the mileage of telephone lines. According to its report for the past year, the company had a total of 165,347 subscribers and nearly 200,000 telephones in use at the close of the year.

Germany.—RADIO LICENCES.—On July 1st the number of receiving licences issued was 4,119,531, of which 412,177 were issued free to unemployed, blind or maimed, &c., as compared with 4,168,440 and 356,837 respectively on April 1st.

Great Britain.—RADIO EXCHANGES.—Christchurch Town Council has referred back for further inquiries a recommendation to allow the New Forest Broadcast Service Co. to establish a relay service for the borough.

Chelmsford Corporation Roads Committee has received applications from Mr. W. G. Denny, of Clacton-on-Sea, and the Broadcast Relay Service, Ltd.

London.—TELEPRINTER SERVICE.—On August 15th a teleprinter service will be made available by the General Post Office. It is to be operated in conjunction with the public telephone exchange system, the machines enabling any kind of message to be typewritten between the offices of any two subscribers at any distance from each other. Machines will be hired on similar terms to ordinary telephone instruments.

South Africa.—NEW RADIO STATION.—Complaints about the inaudibility of the Cape Town broadcasting station have resulted in the decision to build a new transmitter, says *World Radio*. Negotiations for the purchase of a suitable building have commenced.

Switzerland.—TELEPHONY.—At the beginning of this year 324,088 telephones were installed in the country. This means that 8 per cent. of the population have telephones—a percentage only exceeded in Europe by Denmark and Sweden.

Woodworking machines in a building contractor's shop: Left: A four-cutter machine (30-h.p. motor); right: A lightning rip machine with Igranic push-button control (see "Electricity in the Building Industry," page 186)

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—MELBOURNE.—September 20th. City Council. 300 miles of telephone wire. (A.X. 11406.)*
September 26th. Totally enclosed metal-clad 6,600-V switchgear. (A.X. 11435.)*
September 27th. Vitreous resistances. (A.X. 11412.)*
October 4th. Posts and Telegraphs Department. Switchboard and instrument plugs. (A.X. 11427.)* Instrument cords. (A.X.11428.)*
October 11th. Condensers. (A.X. 11436.)*
SYDNEY.—September 26th. Miniature-type control gear for Pyrmont power station. (A.X. 11439.)*

Barking.—August 26th. Electricity Department. E.h.p. switchgear and 230-kW rectifying equipment. (July 29th.)

Birmingham.—August 13th. Watch Committee. Installation of electric lighting, power supply, and underground cabling at Perry Barr fire station, College Road. Mr. H. H. Humphries, city engineer, Council House (deposit £3).

Birtley (Co. Durham).—Parish Council. Maintenance of electric street lighting. Mr. F. Ridley, clerk, 29, Neville Crescent, Birtley.

Dundee.—August 10th. Electricity Department. Cable. (July 29th.)

Egypt.—CAIRO.—August 15th. Egyptian Government. Electrification of Assouan Dam (£4,000,000).—*Reuter* (Cairo).
September 24th. Ministry of the Interior. Ice-making plant at Minieh, Zagazig, Fayoum, Keneh and Assouan. (A.X. 11414.)* Four 25-kVA transformers. (A.X. 11429.)*
September 20th. Steel poles, armoured cable, &c. (A.X. 11415.)*

Grays Thurrock.—August 9th. Electricity Department. Installation work in connection with assisted wiring scheme. (See this issue.)

Leeds.—August 20th. West Riding Mental Deficiency Committee. Electricians' work at Oulton Hall, Oulton. County architect, County Hall, Wakefield.

Manchester.—August 25th. Electricity Department. Boilers, &c., for Stuart Street power station, Bradford. (July 29th.)
August 8th. Public Health Committee. Switchboard with wiring, for new cinema talking apparatus at Baguley Sanatorium. City architect, Town Hall.
August 16th. Electric bed lift, at Withington Hospital and Institution, West Didsbury. City architect, Town Hall (deposit 10s.).

Morocco.—RABAT.—August 12th. Shereefian Post Office. Telephone cable. (A.X. 11413.)*

New Zealand.—WELLINGTON.—September 27th. Public Works Department. Insulators. (A.X. 11443.)*

South Africa.—JOHANNESBURG.—September 1st. Rand Water Board. One 3-phase, 1,750-kVA, 16,500/3,300-V, 25-cycle, oil-immersed outdoor type transformer, and one indoor type, 100-A circuit breaker, suitable for a 16,500-V, 25-cycle supply. (A.X. 11407.)*
September 6th. One 1,850-kW turbo-generator. (A.X. 11426.)*
August 25th. City Council. Porcelain insulators. (A.X. 11424.)* Weatherproof copper wire. (A.X. 11425.)*
CAPE TOWN.—August 17th. Electricity Department. A.c. motors and control gear. (A.X. 11411.)*
August 24th. Cables. (A.X. 11423.)*
September 14th. Electrically driven pumping equipment. (G.X. 11715.)*

Southend-on-Sea.—September 8th. Electricity Department. H.p. and l.p. cables. (See this issue.)

Swansea.—September 8th. Electricity Department. Steam-raising plant. (July 29th.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Bath.—Electricity Committee. Recommended. Coal-handling plant (£1,773).—H. J. H. King & Co.

Blaydon-on-Tyne.—Urban District Council. Accepted. Electrical accessories in connection with the housing scheme.—J. Gledson & Sons.

Brighton.—Electricity Committee. Accepted. 30,000-kW turbo-alternator with condensing plant and auxiliaries (£46,000).—C. A. Parsons & Co., Ltd. Three 150,000-lb. per hour nominal evaporative capacity steam-raising units, together with combustion equipment and auxiliaries (£127,899).—Stirling Boiler Co., Ltd.

Chelmsford.—Town Council. Accepted. Installation of automatic traffic signals (£447).—Laurence Scott & Electromotors, Ltd.

Dundee.—Corporation. Accepted. Five sets of traffic signals.—Revo Electric Co., Ltd.

Durham.—County Council. Accepted. Installation of electricity at the Houghton-le-Springs Police Station (£85).—Charles Ramsay & Sons.

Inverness.—District Asylum Committee. Accepted. Electric lighting at sanatorium of the asylum (£102).—R. E. Ramsay.

Leeds.—Tramways Committee. Accepted. Trackwork in Wellington Road (£330).—Titan Trackwork Co., Ltd.
Electricity Committee. Accepted. Four sub-station kiosks (£648).—Yorkshire Switchgear & Engineering Co., Ltd. Cables.—W. T. Henley's Telegraph Works Co., Ltd. (£542); Enfield Cable Works, Ltd. (£332); Macintosh Cable Co., Ltd. (£1,296); Edison Swan Cables, Ltd. (£1,156); Hackbridge Cable Co., Ltd. (£142).

Manchester.—Transport Committee. Recommended. Cadmium-copper trolley wire.—R. Johnson & Nephew, Ltd.

Sheffield.—Electricity Committee. Accepted. Three 450-kVA transformers (£784).—Hackbridge Electric Construction Co., Ltd. Three 450-kVA transformers (£784).—Metropolitan-Vickers Electrical Co., Ltd. Sub-station switchgear (£1,898).—A. Reyrolle & Co., Ltd.

Stirlingshire.—County Council. Accepted. Installation of electric lighting at 36 houses at Bannockburn (£288).—H. A. Miller.

Surrey.—County Council. Accepted. Installation of synchronised clocks at Nethern Hospital (£606).—Magneta Time Co., Ltd.

Wolverhampton.—Electricity Committee. Accepted. Conversion of 39 3-core and 19 6-core trucks of a rupturing capacity of 150,000 kVA (£3,223).—Ferguson, Pailin, Ltd. Alteration and modification of switchgear at Commercial Road station (£4,216).—A. Reyrolle & Co., Ltd. One 37-panel 500,000-kVA, 6,000-V metal-clad compound-filled duplicate busbar remote electrically operated switchboard, complete with control board (£43,815).—General Electric Co., Ltd.

Notes

Electricity in Northumberland Show

The Northumberland Agricultural Society's Show was held recently on the Newcastle Town Moor, approximately one hundred firms taking stands to display agricultural implements and other products connected with the farming industry and rural life.

The Newcastle-upon-Tyne Electric Supply Co., Ltd., displayed a large range of farming apparatus and a special electricity supply was arranged so that all exhibits could be shown in actual operation.

In the farming section a Marshall electrically driven threshing machine was demonstrated, and a Keith Blackman fan showed the cold air method of drying hay. A new type of portable bogie designed by the agricultural staff of the N.E.S. Co. incorporated a counter-shaft and friction hoist, the latter to be used for stacking hay, &c., by means of the hay pole which is the most common method used in the area of supply of the company and its subsidiaries. A "Teles" crosscut saw by the T. L. Smith Co. was on view, as well as a circular saw belted to an "English Electric" portable motor.

A high candle power lamp was shown in the horticultural section, bringing flowering plants into bloom; also a small seed germinating frame fitted with a Stephen's "Stuwa"

One of the exhibits at the Northumberland show

heating board, and a garden frame, the soil of which was heated by a G.E.C. cable, controlled by a time switch. Electrically operated lawn mowers by Messrs. Ransomes, Sims and Jefferies, and the Reay Gear Works, could be operated by members of the public who were interested in such machines.

In the dairy section an extensive range of appliances was exhibited including a 40-gallon "Ethylor" milk cooler by Messrs. Barford & Perkins, and a Reyrolle electric heater was used to generate steam for a sterilising chest made by Messrs. Thomas Hill, of Hull, who also provided a single-brush bottle-washing equipment. Hot water was obtained from a "Sadia," whilst Messrs. Shevell & Sons provided a refrigerating cabinet. Other apparatus included a portable Alfa-Laval milking plant, a Cooper-Stewart cattle- and horse-clipping machine, and Wolseley and Cooper-Stewart sheep-shearing equipments.

There was a comprehensive display of incubators (Edwin Chambers, Ltd., and H. Stephens), battery brooders (Stephen's Trade Corporation), egg testing and candling lamps, &c.

The N.E.S. Co.'s travelling showroom was present, completely furnished and equipped electrically as a farm living-room kitchen.

An Open-air Theatre

An open-air theatre was inaugurated on July 28th by Sir Maurice Jenks, the Lord Mayor of London, at Peasholm, near Scarborough. The stage is on an island in the centre of a lake, and immediately opposite is a natural tiered auditorium capable of accommodating 10,000 people. The success of the lighting is due to Mr. E. J. Jarvis, the borough electrical engineer, Scarborough, and his staff, in conjunction with the Illuminating Engineering Department of the General Electric Co., Ltd., who prepared the scheme. The main frontal lighting for illuminating the island stage consists of a bank of twelve three-lamp floodlighting units of new design. Each of these is equipped with three 1,000-W "Osram" lamps, while colour screens are fitted. This lighting is augmented by scores of other floodlights. All around are electric lamps for subsidiary lighting, while over the auditorium "Wembley" lanterns are installed. Sir Edward German's *Merrie England* was chosen for the inauguration, and this will be given twice weekly until September. A night view of the theatre appears on p. 191.

Increasing Use of Public Address Equipment

Mullard public address equipment was selected for service at the Royal National Eisteddfod, the Welsh annual festival of music, held at Port Talbot this week. The installation in the pavilion consisted of a large number of small speakers, distributed throughout the hall, thereby rendering the volume of sound uniform throughout the building. For the overflow meeting in the open air a smaller number of standard giant speakers were used.

At the unveiling of the Arras War Memorial by Lord Trenchard on July 31st, and again at the unveiling of the Thiepval War Memorial by the Prince of Wales on August 1st, Marconiphone amplifiers and loud-speakers were used exclusively to transmit the unveiling ceremony over a wide area. At the Southern Command military tattoo at Tidworth this week Marconiphone equipment is being used, and similar equipment was also used for the first time this year at the Woolwich tattoo.

Large Pelton Wheels for India

Some hydro-electric units of unusual interest in connection with the Shanon generating plant of the Uhl River project in the Punjab have been recently completed, and are claimed to be the largest single-runner Pelton turbines ever made in England. These machines—there are four of them—are each of 17,000 h.p., and are also noteworthy on account of the elaborate arrangements which have been made for their automatic control. They have been made to the designs of Boving & Co., of London, by Markham & Co., of Chesterfield. The generators which they drive are by the British Thomson-Houston Co. Each unit comprises a single-runner Pelton wheel, with a single jet, which is overhung at the end of a generator shaft. It is capable of developing 17,000 h.p. when running at a normal speed of 1,668 ft. The wheels will, however, be ultimately worked under a head of 2,000 ft., when a dam in the river has been raised. Each wheel is built up of a solid sheet disc 6ft. 6½in. in diameter to which are bolted 22 buckets cast in pairs with lugs that embrace the disc, and each pair is held by three bolts. The jet has a maximum diameter of 8in., and emerges from a stainless-steel orifice which is of forged material, and is bolted to a cast-steel nipple on the end of the inlet bend so that it can be easily removed.

The governing of each turbine is done by a sensitive pendulum driven by an endless belt from the governor shaft. The pendulum controls, by means of oil under pressure through its own regulating valves and servo-motor, the movement of the deflector acting on the jet. The speed of the machine is controlled in normal circumstances by the centrifugal pendulum, which comprises a pair of weights encased in a pulley driven by belt from the main turbine shaft.

Situated in Mundi State, some 200 miles north-east of Lahore, in the wild, rocky country which constitutes the foothills of the Himalayas, the remarkable project will furnish electric power throughout the wide area of the Punjab.

A Church Floodlighting Scheme

Experiments were recently successfully carried out by Southend-on-Sea Electricity Department in the floodlighting of St. Clement's Church, Leigh-on-Sea. This ancient edifice, with its carving and quaint gargoyles, is a particularly interesting subject for floodlighting, and the scheme has revealed many beauties which have hitherto remained hidden to the casual observer.

Greenhouse Heating

Electric soil heating in greenhouses is being developed by the British Columbia Electric Railway Co., Ltd., on the lower mainland. Some time ago the company was the pioneer of electric hotbeds, and achieved such marked success that attention was directed to the heating of soil in greenhouses. An initial installation was made at the commercial gardens of Mr. H. S. Leong, at whose garden the pioneer electric hot-bed had also been installed. Results have passed all expectations.

Cucumbers grown in the electrically heated soil were large, succulent, and ready for market six weeks before similar plants put in at the same date in beds in the same greenhouse which were not electrically heated, but which enjoyed only ordinary greenhouse heat. They were on the market at a time when cucumbers were being imported into British Columbia from California, and thus they secured a much higher price than home grown plants ever secured in the past. After six weeks the plants averaged 6 ft. in height, as compared with an average height of 3 ft. for the ordinary plants.

Each of the electrically treated vines bore approximately three dozen cucumbers, and there was a total of 132 vines in the soil-heated beds. Mr. Leong estimated that an average of $1.00 per dozen above the normal market price was secured for about 400 dozen cucumbers, representing an additional profit of $400, while the cost of soil heating was $30, or approximately one half cent per cucumber. Speed in growth was also found to increase the flavour of the cucumbers.

Experiments also proved that electric soil heating made it possible to lower the temperature of the ordinary greenhouse by about 10 degrees, which meant an economy in fuel cost and this further reduced the average cost per cucumber an increased the profit.

The electric heating cable in the greenhouse was place 8 in. below soil surface. The seedlings were staggered abou 18 in. apart on each side of the cable and about 6 in. from it. The heat in this installation was manually controlled, but further economy in heating costs could have been secured by the use of a control thermostat.

Mr. Leong is thoroughly satisfied with the experiment intends to increase his use of electric soil heat considera His success has also interested many other growers, who a paying visits to his greenhouses to study results and observe the installation plan.

The B.C. Electric Railway Company has formed a horticultural department under the direction of Mr. Sydney J. Bowman and is developing this new field for electricity to the fullest extent. The company has also issued a comprehensive booklet on horticultural uses of electricity.

An Italian Tower Wagon

A petrol tower wagon constructed by the Fiat Co. of Turin has lately been put in service by the municipal electricity department of Milan. The tower is telescopic and is operated by a hydraulic jack, oil being pumped into concentric steel cylinders. The pump is driven by an electric motor, power for which is obtained from accumulators carried in the body of the vehicle. When raised to its fullest extent, the tower has a height of 30 ft., and an automatic clutch then disengages the oil-pump drive. The controls for the hydraulic pump are situated on the rising platform, so that the electrician can raise or lower himself to any required height, which assists materially in speeding up his work and avoiding traffic dislocation. The top platform is constructed entirely of an aluminium alloy, the extending portion being pushed out by hand and fixed in position by means of a pawl dropped into the teeth of a rack. The platform is also capable of being rotated b means of a worm and worm-wheel gear, driven by a sma electric motor. The controls for rotation, like those for rais ing and lowering, are situated in the gallery. The platform has a 13 ft. 6 in. sideways extension, which permits the appliance to be used without interrupting the tramway service.

Wireless in Coal Mines

An ambitious scheme is being considered for wireless telephone communication all over the underground parts of two large Yorkshire coal mines. The pits concerned are the Manor Haigh and the Roundwood, in the Wakefield colliery area. The engineer concerned, supported enthusiastically by the directors, who have been pioneers in other electrical applications in coal mining, is Mr. John Bentham, of Crofton Rectory, Wakefield, consulting electrical and mining engineer.

It is claimed that if the experiments prove successful they will improve coal pit safety measures, for men in all parts of a mine can be warned instantly. Experiments have been proceeding some time in conjunction with certain London radio supply firms on a small scale, and large scale equipment is now being installed.

The intention is to erect a transmitting and receiving station at the pithead of the Manor Haigh Colliery. Telephone receiving and transmitting sets will be assembled in all parts fa underground and even extended to the Roundwood Colliery, which is linked to Manor Haigh by an underground road. Test messages distributed from the central station at varying power will be picked up in various parts of the workings and return messages received at the pithead station. The pithead aerial mast will be 35 ft. high and a basic power of 0.25 kW will be used for the transmission.

Model Car Racing

A model racing track on which electrically driven miniature cars race, has been developed by Sir Henry Birkin, Ltd., Welwyn Garden City. The cars collect the current from the track on which they race. These model tracks are commercial and endeavours are being made to get them installed at various centres throughout the country.

Women Engineers

The tenth annual conference of the Women's Engineering Society will be held at University College, Southampton, from September 16th to 19th. Features of electrical interest will be short lectures by Miss C. Haslett, Miss M. M. Partridge, Miss N. M. Jeans, and Miss N. E. Miller. Miss V. Holmes (president, W.E.S.) will take the chair.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

B.B.C. Appointments.—The British Broadcasting Corporation announces that in preparation for the introduction of the Empire broadcasting service, Mr. C. G. Graves has been appointed director of the Empire Department. Mr. G. C. Beadle, station director, Belfast, becomes assistant director of programmes in place of Mr. Graves, and Mr. G. L. Marshall, station director, Newcastle, succeeds Mr. Beadle as station director, Belfast. The post of station director at Newcastle, vacated by Mr. Marshall, will be filled at a later date.

Mr. G. W. Parker

The appointment of **Mr. G. W. Parker,** mains superintendent at Grimsby, as chief assistant in the Corporation Electricity Department, has now been confirmed by the Corporation. Mr. Parker was educated at the Grammar School, Caistor, Lincolnshire, and there received part of his technical education, which was later continued at the Technical School, Newark-on-Trent, and the Grimsby Municipal College. After serving a two years' apprenticeship with Messrs. W. P. L. Harrison & Co., Newark-on-Trent, he was for a period at the Grantham electricity works. He then joined the staff of the Corporation electricity works, Grimsby, in October, 1903, as a junior assistant; three years later he was appointed mains superintendent, and has continued in this position up to his recent promotion. During the War he served in France, was severely wounded, and was awarded the Military Medal and Bar.

Mr. S. H. Fowles, borough electrical engineer of Loughborough, has been appointed electrical engineer to the Heston and Isleworth Urban District Council. The Heston and Isleworth district will become a borough by Royal Charter in November next.

Mr. James E. Adam, distribution superintendent with Paisley Corporation, has been appointed electrical engineer and manager of the burgh in succession to Mr. W. Blair Smith, at a salary of £475. Mr. Adam, who has been in the service of the Corporation for the past fifteen years, has been distribution superintendent since 1924.

Mr. C. A. Turner, of the Hawkhurst staff of the Weald Electricity Supply Co., Ltd., who was recently married to Miss W. M. Wells, of Cranbrook, has been presented by the directors with a number of electrical appliances.

Mr. A. Rosen, Ph.D., A.M.I.E.E.

Dr. A. Rosen, whose portrait appears herewith, is the author of the article on "Submarine Cable Testing" on another page of this issue. He has been with Messrs. Siemens Brothers & Co., Ltd., Woolwich, for a number of years and has published several papers dealing with the theoretical and practical aspects of submarine cables and their operation.

Brighton Town Council has approved the increase in the salary of its electrical engineer, **Mr. W. N. C. Clinch,** from £1,600 to £1,800, rising by two further increments of £100 to £2,000.

Mr. and Mrs. W. H. Swallow, of Uckfield, Sussex, celebrated their silver wedding on July 22nd. Mr. Swallow is engineer and manager of the Uckfield Gas and Electricity Co., and he and his wife received from the staff a present of silver and china ware.

Mr. E. R. A. Milne, a Stella Coal Co. mining student, has been awarded the "George May" prize by the North-East Coast Institute of Mining and Mechanical Engineers (Students' Section) for his paper on "A Few Notes on the Electrical Frequency Change in the North-East—with reference to Collieries." The conditions of the award are that Mr. Milne shall visit colliery districts at home and abroad.

Mr. S. Starkey, signal engineer at Cape Town for the South African Government Railways, has been appointed signal engineer for the whole Union railway system, with headquarters at Johannesburg.

Mr. G. C. Milnes, electrical engineer to the Lancaster Corporation, has been voted an increase of salary to £1,200 as from April last, rising to £1,250 in April, 1933. The graduated scale of remuneration based on the quantity of electricity sold has been abolished.

Mr. and Mrs. W. T. Tallent-Bateman are returning to this country and will arrive about August 20th. They have been in Canada, the United States and South America for the last three years. Mr. Tallent-Bateman's address while in England will be c/o Messrs. Ferguson, Pailin, Ltd., Higher Openshaw. Mr. and Mrs. Tallent-Bateman expect to stay here for about six months.

Mr. R. O. Martin, of Willesden, has been appointed by Ipswich Corporation Electricity Committee as power station superintendent out of 130 applicants.

Mr. G. S. Harvey, manager, Exide Battery Service, was married on August 2nd at Bury, Lancs, to Miss A. Whewell.

Mr. W. E. Groves, mains engineer, of the Birmingham Electric Supply Department, who recently retired after forty years' service with the Corporation and the former Electric Supply Company, was, at a recent meeting of the Electricity Supply Committee, presented by the Chairman, Sir Percival Bower, with an illuminated resolution expressing appreciation of his services.

Sir Frederick Gardiner, K.B.E. (left) who has resigned from the chairmanship of the Clyde Valley Electrical Power Co. and its associated companies, and his successor, Mr. Charles Ker, LL.D., who has been deputy-chairman of the companies for some years

Obituary

Mr. G. Tharle.—The death occurred suddenly on July 23rd, at the age of 38 years, of Mr. George Tharle, assistant electrical engineer at Canterbury. He had been at Canterbury for two and a half years, and previously held appointments at Bournemouth and Portsmouth.

Dr. W. Peukert.—The death recently occurred in Vienna at the age of 77 years of Prof. Dr. Wilhelm Peukert, a leading Austrian authority on accumulators, electrical measurement and high frequency currents.

Councillor T. Greenhalgh.—We regret to record the death of Councillor Thomas Greenhalgh, chairman of the Heywood Corporation Tramways and Electricity Committee. He entered the Town Council in 1926 and became chairman of the Committee on the death of Ald. D. Healey.

The Largest Oil Engine

The big oil engine now approaching completion at Burmeister and Wain's works at Copenhagen is of considerable interest to those concerned with the development of electricity generating stations, particularly for peak-load purposes. It has the largest output of any internal-combustion motor yet constructed, for whilst the normal designed output is 18,500 b.h.p., it has to maintain 22,000 b.h.p. continuously if necessary.

It is of the Burmeister and Wain double-acting two-stroke type. There are eight cylinders, 840 mm. in diameter with a piston stroke of 1,500 mm., these dimensions, says the *Motor Ship*, being the same as those of the first four-stroke double-acting Burmeister and Wain engines installed in several motor ships. For the higher output mentioned, it operates at 115 r.p.m., driving a 15,000-kW, 6,000-V alternator, for installation in the Copenhagen electric power station. It has the usual exhaust piston valves operated by vertical rods at the top.

Contractors' Supplies in Portugal

A CONFIDENTIAL report has been issued by the Department of Overseas Trade on the market for electrical contractors' supplies in Portugal.

The wiring regulations in force in Portugal are those of the Vorschriftenbuch des Verbandes Deutscher Electrotechniker, and a Government Department is responsible for inspecting all lighting and power installations, and for issuing licences which must be obtained before any installation is put into service.

The public supply companies have a special arrangement with the authorities whereby they inspect installations in the factories, offices and dwellings of their consumers, issue the licences and collect the annual taxes, together with their monthly bills for the energy consumed. For independent generating plants it is necessary to submit plans and a description of the proposed installations for approval before starting the work, and these must be signed by a qualified engineer.

Wiring Systems

Many wiring systems are in use, the most popular being carried out with v.i.r. taped and braided wire encased in tubing embedded in the walls. A considerable number of installations are now being carried out with twin lead-covered wire. Cheaper installations are done with twisted cotton braided flexible wire run on insulators and entirely exposed, except in places where they come within reach, such as for down leads to switches and wall sockets. Ordinary v.i.r. taped and braided wires run on porcelain cleats are also permitted, and frequently used in warehouses, factories, &c. Conduit encased wiring is occasionally used where a greater degree of protection is required, such as in petrol installations. In these cases ordinary galvanised iron tubing usually ½ in. diameter is used. Connection boxes, &c., for this system are made locally of cast brass, these working out cheaper than imported cast iron boxes.

No standard fuse and switch fuse boxes or distribution boards are imported as the cost would be prohibitive. Contractors make up their own switch and distribution boards to suit individual cases, and generally use panels of locally quarried marble. Ceiling roses are of porcelain, in one piece for flexible cord installations, and with screw-on covers for other systems of wiring. Lampholders are of the Edison screw type; practically no bayonet holders are in use except on board ships. Switches are nearly always of the rotary pattern, although some tumbler switches are used. Plugs and sockets are of the two-pin type, both pins being of the same diameter. Porcelain ceiling roses, switches, plugs and sockets, as well as lampholders and tubing, are made locally.

The bulk of locally made electrical accessories are of an inferior class, with the exception of porcelain insulators which are now being exported to compete with foreign makes. Owing to high import duties foreign made accessories are only used in the best class of installation.

The customs tariff is extremely vague so far as electrical accessories are concerned, and it frequently happens that an article of higher first cost can be retailed in Portugal at a lower price than an article of low first cost at the factory. It is very difficult to ascertain beforehand how any article will be classified, and it is usually advisable to make a small trial shipment. A great deal of experience is required to know what class of goods can be imported without loss.

Extensive Local Production

There is a large local production of all types of electrical contractors' supplies. The principal foreign competitor is Germany, from whom in 1930 imports of insulating materials were valued at £12,000 out of a total of £28,000. Statistics for 1931 are not available, but imports have fallen off considerably owing to the depressed condition of industry and the contraction of purchasing power. Generally speaking, however, German prices are said to be about 40 per cent. lower than United Kingdom prices, which sufficiently explains the reason for the small importation of insulating materials from the United Kingdom.

The bulk of the market is in the hands of local manufacturers, with whom there is no likelihood of any foreign country being able to compete, except in the case of high-class material. The German share of the market is secure so long as the cost of United Kingdom products is non-competitive.

No figures are available regarding the importation of light shades, but Germany is the principal source of supply, followed by Czecho-Slovakia.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

All-Power Transformers, Ltd.—Private company. Registered July 28th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in radio, gramophone and electrical goods, &c. The subscribers are: C. C. Janning, 5, Great Chapel Street, W.1, and S. Jarrett, 17, Shaftesbury Avenue, W.1. Solicitors: Stanley Jarrett & Co., 17, Shaftesbury Avenue, W.1.

W. H. Stone & Co. (Cardiff), Ltd.—Private company. Registered July 30th. Capital, £2,000 in £1 shares. Objects: To carry on the business of electrical, wireless, mechanical and general engineers' agents, merchants and distributors, manufacturers of and dealers in radio and telephone apparatus, &c. The subscribers are: W. H. Stone and Mrs. G. S. H. Stone, both of "Linton," Rhiwbina, near Cardiff. Solicitors: Grover, Grover & Williamson, 26, Charles Street, Cardiff.

Bush Radio, Ltd.—Private company. Registered July 30th. Capital, £2,500 in £1 shares. Objects: To acquire and turn to account interests in any invention relating to the science of sound, &c. The subscribers are: H. S. White and C. H. Brown, both of 142-150, Wardour Street, W.1. Solicitors: Lawrence, Messer & Co., 16, Coleman Street, E.C.

Kingsway Electrical Products, Ltd.—Private company. Registered July 23rd. Capital, £100 in 1s. shares. Objects: To adopt an agreement with H. T. Morgan for the acquisition of Patent Application No. 6389, dated March 3rd, 1932, and to carry on the business of manufacturers of radio apparatus, dry batteries, accumulators, etc. The directors are: H. T. Morgan, 218, Oxford Street, Swansea; F. C. Horrocks, 38, Waterloo Road, Southport; and H. Sharrott, 128, Lillington Street, S.W.1. Registered office: 121, Kingsway, W.C.2.

G. H. Green & Co. (Willesden), Ltd.—Private company. Registered July 18th. Capital, £100 in £1 shares. Objects: To carry on the business of electrical and general engineers, designers and manufacturers of illuminated signs, reflectors, floodlights and lighting fittings, etc. The first directors are: W. J. Green, 58, Arthur Road, Holloway, N.7; A. C. Green, 16, Dorchester Road, Northolt Park; and C. S. Riley, 2a, Fontenoy Road, Balham, S.W.12.

Returns of Electrical Companies

Telephone Berliner (London), Ltd.—Capital, £1,000 in £1 shares. Return dated December 22nd, 1931 (filed April 23rd, 1932). All shares taken up. £1,000 paid. Mortgages and charges, £900.

Whitehead Bros., Ltd.—Capital, £12,000 in £1 shares. Return dated December 31st, 1931 (filed April 1st, 1932). 8,004 shares taken up. £4 paid. £8,000 considered as paid. Mortgages and charges, £400.

Standard Manufacturing (Wireless) Co., Ltd.—Capital, £400 in £1 shares. Return dated March 3rd, 1932. 300 shares taken up. £300 paid. Mortgages and charges, nil.

Photographic Electrical Co., Ltd.—Capital, £100 in £1 shares. Return dated December 8th, 1931. 22 shares taken up. £22 paid. Mortgages and charges, nil.

Bamford Works, Ltd.—Debenture dated July 15th, 1932, to secure £2,500, charged on the company's undertaking and property, including uncalled capital. Holder: H. Hutton, The Marquis of Granby Hotel, Bamford, Derby.

Vincent Switchgear Manufacturing Co., Ltd.—Debenture dated July 18th, to secure £3,000, charged on company's undertaking and property, present and future, including uncalled capital. Holder: Marjorie L. Abbott, 323, Church Road, Yardley, Birmingham.

Harry Astbury, Ltd.—Capital, £1,000 in £1 shares. Return dated March 22nd, 1932. 366 shares taken up. £366 paid. Mortgages and charges, nil.

Eden Valley Electrical Co., Ltd.—Capital, £500 in £1 shares. Return dated April 14th, 1932. 500 shares taken up. £500 paid. Mortgages and charges, nil.

Concordia Electric Safety Lamp Co., Ltd.—Capital, £30,000 in £1 shares. Return dated May 19th, 1932. 28,000 shares issued and fully paid up. Mortgages and charges, none registered. (Capital increased by the addition of £30,000 to £60,000 in £1 shares on June 14th, 1932.)

City Notes

The Anglo-Argentine Tramways Co., Ltd., reports gross receipts for 1931 of £3,840,368, as compared with £4,324,836 in the preceding year. After deducting expenses (including a loss on exchange of £269,326), debenture interest, and the annuity to the City of Buenos Ayres Tramways Co. (1904), Ltd., and adding £7,286 brought in, there is a debit balance of £371,224 to be carried forward. The number of passengers carried decreased from 522,425,810 to 461,904,215. The report states that further economies were effected in expenditure, but these were offset by the reduced revenue due to the depressed economic situation of the country, and also to the competition from motor omnibuses, &c. The company continues to press the authorities for better conditions of operation. With the advent of the new Government the matter has again been taken up with the authorities and negotiations are now in hand with the object of arriving at a solution of the question by the formation of a combine based on the proposals put forward by the Intendente to take over the whole of the transportation business in the city, in which both the Municipality and the present owners would be represented. The chairman, who has just returned from a visit to Argentina, will report on the situation at the annual meeting which is being held to-day (Friday).

The Yorkshire Electric Power Co., in its interim report, announces dividends on the cumulative preference and ordinary share capital at the rate of 6 per cent. per annum for the half-year ended June 30th. There is no substantial change in general trade conditions in the company's area of supply. The output of electricity continues to grow, particularly for lighting and domestic purposes. The company has been authorised by the North Lincolnshire and Howdenshire Electricity Special Order, 1932, to supply electricity for all purposes in parts of the rural district of Tadcaster in the West Riding of the County of York; in the rural district of Howden and parts of the rural districts of Escrick and Riccall in the East Riding of the County of York; in the urban districts of Brigg, Crowle, Market Rasen, Roxby-cum-Risby and Winterton; the rural districts of Gainsborough and Isle of Axholme and parts of the rural districts of Caistor, Glanford Brigg and Welton in the district of Lindsey, Lincolnshire. This increases the company's area of supply to approximately 2,470 sq. miles. The directors record that a baronetcy has been conferred upon Mr. R. G. Ellis, D.L., M.P., who has been a director of the company since 1921.

The Electrical Distribution of Yorkshire, Ltd., has declared an interim dividend on the ordinary shares at the rate of 9 per cent. per annum for the half-year ended June 30th. The report for the period mentions that at a meeting of shareholders held on April 5th the authorised capital of the company was increased from £1,500,000 to £1,900,000, and new articles of association were adopted. Following this, an issue of 400,000 6 per cent. cumulative preference shares of £1 each was made to the shareholders at a price of 21s. per share, and was applied for more than nine times over. In accordance with the terms of issue, the dividend on these preference shares will be payable in March next with the dividend on the ordinary share capital. There has been a substantial increase during the half-year in the use of electrical apparatus and in the sale of electricity. The company has acquired the whole of the share capital in the Mid-Cumberland Electricity Co., Ltd., and the Penrith Electric Supply Co., Ltd. The area in which these companies are authorised to supply electricity for all purposes is approximately 860 sq. miles.

The Southern Brazil Electric Co. proposes to suspend the annual redemption of 6½ per cent. mortgage debentures for 1932 to 1934, to reduce the rate of interest payable to 3 per cent. per annum for three years, and to suspend for 1933 and 1934 the annual payments to the sinking fund of the £187,500 of 7 per cent. prior lien debenture stock. According to the *Financial Times* the net earnings of the company and of its subsidiaries for the half-year to June 30th last are estimated to amount to approximately 440 contos of reis. This calculation is based on five months' actual and one month's estimated earnings and outgoings. As against this, the interest charge on the mortgage debentures (calculated at an exchange rate of 4 4/5d. per milreis) amounts to approximately 936 contos of reis (£18,713). The company has important capital commitments to meet, namely, the sinking fund charges on the prior lien debenture stock, payable on January 1st, 1933, amounting to approximately 368 contos (£7,365), and capital expenditure for itself and subsidiaries estimated at 750 contos for 1932. Meetings of the debenture holders will be held on August 11th.

The Great Northern Telegraph Co.'s Holding Co. (Ltd.), reports that for the year ended June 30th last the dividend on the shares of the Great Northern Telegraph Co., Ltd., held by the holding company amounted to £98,039, representing 20 per cent. on the 50,000 shares of Kr. 180 each. Accrued interest amounted to £2,181, as compared with £2,265 in the preceding year. After providing for taxes, &c., it is proposed to pay a dividend of 19½ per cent. (against 20 per cent.), leaving £671 to be carried forward. Meeting: Copenhagen, August 13th.

The Telsen Electric Co., Ltd., reports a profit for the thirteen months ended June 30th of £190,533, from which is deducted £25,546 payable to retired directors under agreement and £700 written off good-will, leaving a balance of £164,286. It is proposed to pay a dividend of 10s. per share, tax free, to place £42,000 to tax reserve, and to write off expenses incurred in respect of the increase of capital, amounting to £2,400. The amount carried forward is £41,469. The meeting is to be held in Birmingham on August 10th.

Imperial & International Communications, Ltd., has offered to purchase the West India & Panama Telegraph Co.'s first preference, second preference, and ordinary shares at 5s. per share, payable in cash. The shares are of £10 denomination. The offer is conditional upon the holders of 90 per cent. of the shares of each class accepting it by August 25th.

Mexican Companies.—The Mexican Light & Power Co., Ltd., and the Mexico Tramways Co., held their annual meeting in Toronto on July 28th, when Mr. Miller Lash (chairman) said that there was no great change in power sales, but the tramway service was affected by continued competition. The strike of tramway operators which lasted nearly four months ended in favour of the company.

The Metropolitan Railway Co. has announced a dividend of ¾ per cent. on the ordinary stock (against 1 per cent). The official notice states that the directors have had to have regard to the provisions which, if the London Passenger Transport Bill becomes law, will become operative in respect of the current year. The interim dividend on the surplus lands stock is 1⅜ per cent. (against 1½ per cent.).

The East African Power & Lighting Co. reports a profit for 1931 of £69,163. Of this £12,000 is transferred to depreciation account, £5,000 to general reserve, and £8,500 to investment reserve; the preliminary development account has been reduced by £277. The ordinary dividend is 7 per cent., and £5,473 is carried forward, against £1,987 brought in.

The Calcutta Tramways Co., Ltd., proposes to exercise its option to redeem the 7 per cent. second debentures at 102 and to create and issue £250,000 of debentures, carrying interest at 5 per cent. per annum, at 96. Holders will have the option for five years of converting each new debenture of £100 into 96 fully paid ordinary shares of £1 each.

The English Electric Co. of Canada reports a profit for 1931 of $65,343 (as against $220,929 in 1930), and a balance available for dividends of $25,343. The distribution on class "A" shares absorbs $120,000, leaving a deficit of $94,657. The previous surplus and capital brought forward was $2,631,026, which is reduced by the dividends paid to $2,536,369.

The Northampton Electric Light and Power Co., Ltd., has declared interim dividends of 2½ per cent. on the 5 per cent. preference shares, 4 per cent. on the old ordinary shares, and 3d. per share on the new ordinary shares.

The Bristol Tramways & Carriage Co., Ltd., has declared an interim dividend of 2 per cent. (less tax) on the ordinary shares for the half-year ended June 30th.

The City of Buenos Aires Tramways (1904), Ltd., has announced a dividend of 1s. 3d. per share (5 per cent. per annum) for the quarter ended June 30th (same).

The Dublin United Tramways (1896), Ltd., has declared an interim dividend of 1 per cent., less tax, on the ordinary stock.

The Rushden & District Electric Supply Co., Ltd., has announced an interim dividend of 3½ per cent. on the share capital.

The City of London Electric Lighting Co., Ltd., has declared an interim dividend of 1s. per share (5 per cent) on the ordinary shares.

The Farnham Gas & Electricity Co. has announced an interim dividend of 3½ per cent., less tax, on the ordinary shares (same).

The Lancashire Electric Light & Power Co., Ltd., has declared an interim ordinary dividend of 2½ per cent., actual, less tax.

Joseph Lucas, Ltd., has declared a dividend of 6d. per share on the "A" preference shares and 7.2d. on the "B" preference shares, less tax.

The Power Corporation of Canada has passed the dividend on the common stock for the quarter to July 31st.

The Enfield Cable Works, Ltd., is maintaining the interim ordinary dividend at 10 per cent., actual, less tax.

Stocks and Shares

TUESDAY EVENING.

THE success of the 5 per cent War Loan Conversion scheme has ensured a 3½ per cent. basis of yield, for some time, to British Government stocks. Other securities that take their cue from the front line of gilt-edged issues are standing at levels which pay the investor little more than 4 per cent. on the money, if as much as that. The harassed capitalist, not knowing in what direction to turn in order to get a modest 5 per cent. return, is compelled to widen his scope of inquiry and, in order to satisfy his requirement, to accept stocks and shares of somewhat speculative class. No more striking commentary upon the change that has taken place during the past few months can be found than that furnished by the list of ordinary shares of the London electricity supply companies. In May this year the prices were standing at figures which yielded a 5 per cent. return on an investment. To-day, the income from the same shares is, as reference to our price-list shows, about £4 7s. per cent.

London Electricity Supply

Practically all the ordinary shares in the London companies are quoted at 32s. or higher. Charing Cross and Londons are 32s. 6d.; Kensingtons and Westminsters are 33s. The shares standing at 32s. are Brompton, Chelsea, St. James', and South London. We exclude, of course, City of London, County of London, and Metropolitan, as each of these is governed by conditions different from those applicable to the companies to which the 7 per cent. standard dividend strictly relates. Several of the prices just mentioned are better than last week's, the investment demand being still considerable. County of London new ordinary are harder at 7s. 6d. premium.

Provincial Companies' Shares

Bournemouth and Poole make the best showing in the group of provincial companies' shares. The price has risen ½ to 3½, at which the yield on the basis of the last-paid 15 per cent. dividend is little more than 4¼ per cent. Midland Electric Power ordinary have hardened to 33s. 6d., Clyde Valley to 30s. The various debenture stocks have retained the material rises mentioned here last month.

In the foreign catalogue, Whitehall Electric 7½ per cent. preference recovered further to 16s. 3d. This makes a rally of 3s. within a fortnight. Tokyo Electric 6 per cent. bonds at 63 have gone back a point. The advance of prices amongst preference shares, home and foreign, alluded to last week as forming something of a feature, is still very much in evidence. A number of new issues are known to be in preparation, and will make their appearance upon the raising by the Government of the ban laid upon any financial offer that might have conflicted with the War Loan conversion operation.

Metropolitan Railway Dividend

The declaration of a half-yearly interim dividend of 15s. per cent., actual, upon Metropolitan Railway consolidated stock came up to Stock Exchange market expectations. It compares with 1½ per cent., actual, a year ago, but, although the price of the stock fell 1¼ to 63, the dividend itself is of no particular consequence in view of the offer recently made to the stockholders. The latter probably appreciate the more pleasurably, by reason of the dividend reduction, the bargain which the board has made with the Underground Electric

Railways of London. Districts are unchanged at 58½, holding their last week's gain of 7 points, while "Undies," as the Stock Exchange calls the Underground Company's £1 shares, are rather harder at 18s.

The Rise in Dollar Stocks

Less observed than it would have been in non-Conversion days, a rise in dollar stocks has come as quietly as substantially. Some of the American industrials are nearly double the prices at which they were quoted a few weeks ago. Reasons for the change would include the hopefulness induced by the Lausanne, the Ottawa, and the forthcoming Economic Conferences; the rises in commodities and metals and the natural reaction from such unduly low levels as were reached last month. American Telephone and Telegraph capital stock at 130½ compares with little more than 100 a fortnight back. Internationals have sympathised with a rise to 9. The rises have been on a more modest scale than were some of the falls in the last American slump. American Telephones fell 34 and 28 points on two successive days; General Electrics 47½ and 27 points in the same débâcle. This was on October 28th and 29th, 1929.

Cables and Wireless

The preference and "A" ordinary stocks of Cables and Wireless came into a little demand when the disappointment produced by the meeting had passed. The buying seemed to have bear-covering as a reinforcement, but the speculative investor, too, was in evidence. The latter looks ahead to the time when the preference will be in receipt of its proportion, 5½ per cent., and argues that, meanwhile, a yield of 4½ per cent. on the money, which the preference now affords, is sufficient to save the stock from "eating its head off." The dividend is cumulative, and nobody will controvert the chairman's view that the Communications business will be one of the first to revive upon any increase of commercial activity.

Dividends and Reports

Most of the dividends now being declared by the electricity supply companies are of the same rates as those of a year ago. The City of London Electric Company is paying a dividend of 1s. per share on the ordinary, being at the rate of 10 per cent. per annum, which is the same as before. Northampton has declared 4 per cent. on the old ordinary, and 3d. per share on the new ordinary, both payable on the 23rd of this month. The former rate is unchanged. The Yorkshire Electric Power interim dividend of 3 per cent. is the same as before, and, in its interim report, the company states that the output of electricity continues to grow, particularly for lighting and domestic purposes. The Electrical Distribution of Yorkshire Company, in an interim report, refers to the issue of 400,000 preference, made last April, as having been subscribed more than nine times over. The company mentions that there has been a substantial increase during the past half year in the use of electrical apparatus, and in the sale of electricity. The Rushden and District Electric Supply Company has declared an interim dividend of 3½ per cent., as before.

Manufacturing and Equipment Shares

The maintenance of its interim dividend on the ordinary shares of 10 per cent. had a good effect upon Enfield Cables, and the price rose 7s. 6d. to £4, the preference hardening to 32s. 6d. There had been some idea that the dividend on the ordinary shares might be cut, and the declaration helped to stiffen prices in this market throughout. Callender's B preference improved to 32s. 6d. Henley's recovered the $\frac{1}{16}$ which they shed last week, rallying to 5$\frac{15}{16}$. The improvements secured by a number of the other manufacturing shares last week have been fully held. In the iron, steel, and engineering section, Babcock and Wilcox are better at 43s. 3d., and Vickers keep their advance at 6s. 3d. A slight improvement in the price of raw rubber caused sympathetic improvement in the prices of rubber shares. The general disposition of industrials has been firm, and, as already mentioned, people are on the look out for investments that will give them a better rate of interest on the money than is afforded by the 3½ per cent. War Loan.

Miscellaneous Matters

West India and Panama Telegraphs, in whose shares there was at one time a lively market, have been out of remembrance for so long that a reminder of their present existence sounds strange. The Imperial and International Communications has offered to buy the West India and Panama first and second preference and ordinary shares, all of £10 each, at 5s. per share cash. This is conditional upon 90 per cent. of each class of the shareholders accepting the offer before August 25 next. Anglo-American Telegraph Company's preferred stock is 2 points up at 102½. Oriental Telephones show a small gain at 50s.

Victoria Falls responded to renewed demand with a rise to 67s. 6d. The Mexican group has for its main feature a rise of 7 in Mexican Light and Power common shares. The company's 5 per cent. first mortgage bonds have regained part of the dividend deduction made on Tuesday in this week. Brazilian Tractions show a harder tone, and among the Canadian hydro-electrics, Shawinigans at 17, Power Corporation of Canada at 11, are better than they were on the eve of the Bank Holiday.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1930.	1931.	Price. Aug. 2.	Rise. or Fall.	Yield. p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	70/-	+½	4 5 9
Brompton Ordinary	1	8½	8½	32/-	+1/6	4 7 6
Central Electricity 4½% Deb.	Stock	4½	4½	102½	—	4 7 10
Charing Cross Ordinary	1	8½	8½	32/6	+1/-	4 6 2
Chelsea	1	8¾	8¾	32/-	—	4 7 6
City of London	1	10	10	42/6	—	4 14 1
Clyde Valley	1	8	7	30/-	+6d*	4 13 4
County of London	1	11	10½	47/6	—	4 8 5
Edmundsons' 7% Pref.	1	7	7	29/-	+6d.	4 16 7
Elec. Dis. Yorkshire	1	9	9	38/3	—	4 14 1
Elec. Supply Corporation	1	11	11	52/6	—	4 3 10
Kensington Ordinary	1	8	8	33/-	+6d.	4 4 10
Lancs. Light and Power	1	6½	7	28/9	—	4 17 5
London & Home Counties 4½% Deb.	Stock	4½	4½	106½	—	4 4 6
London Electric	1	9	9	32/6	+1/-	4 6 2
Metropolitan	1	10	10	45/-	—	4 9 0
Midland Counties	1	7	7	31/3	—	4 9 7
Mid. Elec. Power	1	8	8	33,3	+⅛	4 16 9
Newcastle-on-Tyne Ordinary	1	6	6	25/-	—	4 16 0
Do. 7% Pref.	1	7	7	31/-	+6d.	4 10 4
Northampton	1	10	10	45/-	—	4 9 0
Notting Hill 6% Pref.	10	6	6	12½	—	4 16 0
North Met. Elec. 6% Pref.	1	6	6	28/6	—	4 4 3
St. James' and Pall Mall	1	8	8	32/-	+6d.	4 7 6
Scottish Power	1	8	—	31/3	—	5 2 5
South London	1	8½	8½	32/-	—	4 7 6
Urban Ordinary	1	7	—	28/9	—	4 17 5
Westminster Ordinary	1	8½	8½	33/-	+1/-	4 4 10
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	16/3	+1/3	9 4 8
Yorkshire Elec.	1	8	8	37/-	—	4 6 6
HOME RAILS.						
Central London Ord. Assented	Stock	4	4	82½	—	4 17 0
Metropolitan	„	3½	2½	63	−1½	3 19 10
Do. District	„	5	4½	58½	—	7 13 10
Underground Electric	1	8	7	18/-	+6d.	7 15 7
TELEGRAPH AND TELEPHONES.						
American Tel. & Tel.	$100	9	9	130½	+25	6 18 6
Anglo-Am. Tel. Pref.	Stock	6	6	102½	+2	5 17 1
Do. Def.	„	1½	1½	24	—	6 5 0
Cables & Wireless 5½% Pref.	„	5½	2¾	60½	+2	4 11 0
Do. A 7½% Ord.	„	—	Nil	18½	+1	—
Do. B Ord.	„	—	Nil	8	—	—
Globe Tel. and T. Ord.	10	8½	Nil	7	—	—
Do. do. Pref.	10	6	6	10	—	6 0 0
Great Northern Tel.	10	20	20	25½	—	7 17 0
Marconi-Marine	1	15	10	28/9	—	6 19 2
Oriental Telephone Ord.	1	12	12	2½	+⅛	*4 16 0
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	—	—	3/9	—	—
Do. do. 2nd Pref.	5	—	—	3/9	—	—
Do. do. 5% Deb.	Stock	—	—	7	—	—
British Electric Traction Def. Ord.	„	5	5	300	−25	—
Do. do. Pref. Ord.	„	8	8	135½	—	5 18 1
Brazil Traction	100	—	—	12½	+¼	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	98½	—	5 2 7
London & Sub. Trac. 5% Pref.	1	Nil	Nil	8/9	—	—
London United Tram Deb.	Stock	4	4	62½	+1	6 8 0
Mexico Trams, 5% Bonds	—	5	5	22½	—	30 5 10
Mexican Light Common	100	Nil	Nil	14½	+7	—
Do. 7% Pref.	100	7	7	15	—	—
Do. 1st Bonds	—	5	5	54½xd.	+3	9 2 0
Victoria Falls Ord.	1	15	15	67/6	+⅛	4 9 0
Yorkshire (West Riding)	1	Nil	Nil	5/-	—	—
MANUFACTURING COMPANIES.						
Assoc. Elec. Ord.	1	6	4	18/9	—	4 5 4
Do. Pref.	1	8	8	31/3	—	5 2 5
Babcock & Wilcox	1	15	14	43/3	+9d.	6 9 9
British Aluminium Ord.	1	10	5	22/-	—	4 11 0
British Insulated Ord.	1	15	15	61/3	—	4 18 0
Brush Ord.	Stock	5	Nil	40	—	—
Callender's	1	15	15	58/9	—	5 1 10
Do. 6½% Pref.	1	6½	6½	26/3	—	4 19 1
Crompton Parkinson Ord.	5/-	30	24	17/6	—	6 17 2
Do. 8% Pref.	1	8	8	30/-	—	5 6 8
Edison-Swan 1st Pref.	1	7½	7½	23/3	—	6 9 0
Do. 5% Deb.	Stock	5	5	100	—	5 0 0
Electric Construction	1	Nil	Nil	7/6	—	—
Enfield Cable Ord.	1	25	25	4	+7/6	6 5 0
English Electric	1	Nil	Nil	10/9	—	—
Do. do. Pref.	1	Nil	Nil	12/6	—	—
Ever Ready	5/-	35	35	24/-	—	7 5 10
Ferranti Pref.	1	7	7	24/6	—	5 14 3
G.E.C. Pref.	1	6½	6½	28/6	—	4 11 3
Do. Ord.	1	10	8	41/3	—	3 17 6
Henley's	1	30	30	5⅛	+⅛	5 1 1
Do. 4½ Pref.	5	4½	4½	5	—	4 10 0
India-Rubber	1	Nil	Nil	3/9	—	—
Johnson & Phillips	1	10	5	¾	—	5 14 3
Siemens Ord.	1	7½	7½	23/3	—	6 9 0
Telegraph Construction	12	Nil	Nil	10	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1930

11239. "Generation or creation of electric currents or oscillations of high frequency." J. G. Nash. April 9th, 1930. (376370.)

1931

355. "Telephone transmission system." Standard Telephones & Cables, Ltd., and K. E. Latimer. January 5th, 1931. (376245.)

6090. "Automatic protective systems for alternating-current circuits." Johnson & Phillips, Ltd., and S. A. Stigant. February 26th, 1931. (376250.)

6782. "Electric circuit breakers." Stotz-Kontakt Ges. March 4th, 1930. (376298.)

7287. "Electric switchgear." British Thomson-Houston Co., Ltd. March 7th, 1930. (376325.)

9794. "Telephone systems." Automatic Electric Co., Ltd., R. Taylor, J. A. Mason, and J. W. McClew. March 31st, 1931. (Cognate application No. 19482/31.) (376265.)

9877. "Fabricated stator and like frames for dynamo-electric machinery." English Electric Co., Ltd., and E. H. H. Hassler. April 1st, 1931. (376267.)

10031. "Electric switches or circuit breakers and contacts therefor." G. E. Whitehead and Whitehead's Electrical Inventions, Ltd. April 2nd, 1931. (Cognate applications 23886/31 and 28003/31.) (376300.)

10202. "High-resistance rheostats with slide contacts." A. W. Ulitowsky. January 6th, 1931. (376335.)

10381. "Synchronising and phasing systems." Electrical Research Products, Inc. April 8th, 1930. (376309.)

10392. "Electric lampholders and adaptors." J. Graham. April 8th, 1931. (376311.)

10492. "Cooling apparatus suitable for use with tanks containing liquid-immersed electrical apparatus." British Electric Transformer Co., Ltd., and L. Clarke. April 9th, 1931. (376342.)

10523. "Indicating control means for radio apparatus." British Thomson-Houston Co., Ltd. April 10th, 1930. (376345.)

10537. "Electric arc welding." Murex Welding Processes, Ltd., J. H. Paterson, and A. T. Roberts. April 9th, 1931. (376348.)

10662. "Sparking plugs." C. M. Carington and K.L.G. Sparking Plugs, Ltd. April 10th, 1931. (376361.)

10671. "Electrical signalling systems." Associated Telephone & Telegraph Co. May 13th, 1930. (376363.)

10715. "Electric circuit-breaking arrangements for the protection of electrical apparatus." Electrical Research Products, Inc. April 11th, 1930. (376366.)

11021. "Controlling means for electric generating plant." Sir W. G. Armstrong Whitworth & Co. (Engineers), Ltd., and C. M. Beckett. April 14th, 1931. (376382.)

11314. "High-potential winding for transformers, testing transformers, choking coils and the like." Koch & Sterzel Akt.-Ges. April 17th, 1930. (376387.)

11559. "Projection screens combined with loud speakers." British Thomson-Houston Co., Ltd., G. S. C. Lucas, and K. J. R. Cocke. April 18th, 1931. (376395.)

11581. "Apparatus for administering electrical treatment." Electronal, Ltd., and J. H. Nicol. December 17th, 1931. (376396.)

11837. "Electric gasfilled incandescent projection lamps." W. Berger and H. Mendel. December 5th, 1930. (Addition to 10413/31.) (376402.)

12913. "Protective arrangements for electrical apparatus." R. O. Kapp, C. G. Carruthers, and General Electric Co., Ltd. May 1st, 1931. (376409.)

14412. "Junction boxes for electric wiring." F. C. Polden. May 15th, 1931. (376423.)

14914. "Means for regulating the individual motors of multi-motor drives." Siemens-Schuckertwerke Akt.-Ges. May 28th, 1930. (376428.)

15409. "Mercury-vapour rectifiers." General Electric Co., Ltd., and E. Gallizia. May 26th, 1931. (376435.)

15675. "X-ray tubes and other thermionic or electron-discharge devices." British Thomson-Houston Co., Ltd. May 28th, 1930. (376440.)

16383. "Electric condensers." Elektricitäts Akt.-Ges. Hydrawerk. June 7th, 1930. (376446.)

16484. "Starting devices for electrically driven machines." International General Electric Co., Inc. June 5th, 1930. (376448.)

17135. "Machine for filling and cooking dry batteries." H. A. Bumke Ges. September 4th, 1930. (Addition to 354094.) (376458.)

17216. "Enclosed or iron-clad electrical switches." J. A. Crabtree. June 13th, 1931. (376462.)

18263. "Electric current transformers and electric current measuring means." Elliott Bros. (London), Ltd., and G. F. Shotter. June 24th, 1931. (376478.)

19007. "Regulating arrangements for synchronising the individual motors of a multi-electric motor drive." Siemens-Schuckertwerke Akt.-Ges. August 16th, 1930. (376489.)

19455. "Trolley bases for electric vehicles." Brecknell Willis & Co., Ltd., and A. M. Willis. July 6th, 1931. (376494.)

19797. "Television receiving systems and cathode-ray devices suitable for use therein." Marconi's Wireless Telegraph Co., Ltd. August 15th, 1930. (376498.)

20869. "Method of constructing the stator of electrical machines." W. E. Evans (Allgemeine Elektricitäts-Ges.). July 21st, 1931. (376508.)

21192. "Wireless condenser dials." W. Yates. July 24th, 1931. (376510.)

21243. "High-frequency oscillator system." Wired Radio, Inc. December 24th, 1930. (376511.)

21668. "Grid-controlled gaseous electric discharge tubes." Raytheon, Inc. August 25th, 1930. (376517.)

21772. "Electric water heaters." E. A. Coxhead. July 30th, 1931. (376520.)

21944. "Controllers for electric motors." E. W. Seeger. August 4th, 1930. (376522.)

22254. "Electric time switch." O. K. Ellinger. August 6th, 1930. (376524.)

23723. "Valves or electric switches operated automatically after a predetermined interval." R. F. Ringle. August 24th, 1931. (376532.)

24119. "Apparatus for impregnating electric cables." J. Pintsch Akt.-Ges. November 28th, 1930. (376536.)

25262. "Devices for the assembly or grouping of discharge tubes in luminous signs." N. S. Barlow (R. Heller). September 9th, 1931. (376545.)

26534. "Electric time switch." O. K. Ellinger. June 10th, 1931. (Addition to 22254/31.) (376553.)

27254. "Alternating-current motors." P. Böttcher, jun. October 25th, 1930. (376560.)

27274. "Electromagnetic relays." General Railway Signal Co. October 15th, 1930. (376561.)

28080. "Electric lighting, heating and power installations." W. J. Bransom. October 9th, 1931. (376568.)

28700. "Valves electrically operated through planet gearing." Siemens-Schuckertwerke Akt.-Ges. November 20th, 1930. (376577.)

28821. "Apparatus for the production of braided fibrous tubing, especially for electrical purposes." Ges. für Elektrische Isolierungen Ges., and E. Beilhartz. October 16th, 1931. (376578.)

28838. "Variable condensers." Telefunken Ges. für Drahtlose Telegraphie. October 16th, 1930. (376579.)

30801. "Rectifying apparatus for multiphase rectification." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. November 7th, 1930. (376602.)

31056. "Headlights for motor cars and other vehicles." S. R. F. Bergenson. November 9th, 1931. (376608.)

32045. "Aerials and feeding arrangements therefor." Telefunken Ges. für Drahtlose Telegraphie. November 18th, 1930. (376615.)

34325. "Rectifiers of glass having a liquid cathode and an ignition electrode which is provided above the cathode level." Janaer Glaswerk Schott & Gen. December 15th, 1930. (376630.)

34626. "High-tension impregnated electric cables." Bergmann Elektricitäts-Werke Akt.-Ges. December 13th, 1930. (376632.)

34986. "Electric cut-outs." International General Electric Co., Inc. December 24th, 1930. (376636.)

1932

217. "Fixing devices for electric insulators." British Thomson-Houston Co., Ltd. January 3rd, 1931. (376649.)

789. "Battery and generator testing apparatus for motor vehicles." J. C. Schaf, jun. January 11th, 1932. (376653.)

1376. "Process for building up the windings of high-tension dynamo-electrical machines." Siemens-Schuckertwerke Akt.-Ges. January 2nd, 1930. (Divided application on 93/31.) (376270.)

2080. "Depolarising electrodes for electric batteries." Soc. Anon. le Carbone. December 14th, 1931. (Addition to 35445/31.) (376,659.)

2233. "Laminated sheet-iron shells for electric induction furnaces not having a closed iron circuit." Allmänna Svenska Eleketriska Aktiebolaget. January 2nd, 1932. (376660.)

3239. "Light beacon for air traffic and for navigation and similar purposes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. February 5th, 1931. (376668.)

3347. "Devices for obtaining radio reception free from interference." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. February 18th, 1931. (376670.)

10788. "Headlamps for vehicles." R. Bosch Akt.-Ges. May 1st. 1931. (376693.)

10987. "Electrolytic condensers." Elektricitäts Akt.-Ges. Hydrawerk. April 18th, 1931. (376694.)

12407. "Telephone systems." Automatic Electric Co., Ltd., R. Taylor, J. A. Mason, and J. W. McClew. July 6th, 1931. (Divided application on 19482/31.) (376697.)

15107. "Metal-clad electric switchgear." British Thomson-Houston Co., Ltd. March 7th, 1930. (Divided application on 7287/31.) (376369.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be lodged within one month from July 27th :—

Majestic. No. 532852. All goods in Class 8.—The Majestic Electric Co., Ltd., Tariff Road, Tottenham, N.17.

Double Diamond (lettering and design). No. 530570. Class 8. Radio-telegraphic, telephonic, and television apparatus.—E. Powell, trading as the Double Diamond Radio Co., 81, Old Fort Road, Shoreham, Sussex.

Rediffusion. Switch On—That's All (lettering and design). No. 531557. Class 8. Television and radio-telephonic receiving and relaying instruments and apparatus and sound reproducing instruments.—Standard Radio Relay Services, Ltd., Bush House, Aldwych, W.C.2.

Clang. No. 531166. Class 13. Electric switches (ordinary).—Clang, Ltd., 29, The Broadway, Cricklewood, N.W.2.

Gothic. No. 531900. Class 13. Metal goods for electrical purposes.—Gothic Electrical Supplies, Ltd., 13, Severn Street, Birmingham.

Supersev. No. 532996. Class 40. Electric wire covered mainly with india-rubber.—Ivor Rich, 65, Lordship Road, N.16.

Freezolux. No. 528994. Class 50. Refrigerating chests and ice safes.—Electrolux, Ltd., 153-155, Regent Street, W.1.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Barking.—Houses (279), Manor Estate; J. R. Leftley. Covered market, Broadway; L. E. White. Houses (21), Upney Farm Estate, and school clinic, Vicarage field (£5,300); borough engineer.

Barrow-in-Furness.—Houses (16), Harrell Lane; R. Robinson.

Bolton.—Houses (252), Johnson Fold Estate; H. E. Pitt, Ltd., Sunderland. Houses (164), Johnson Fold Estate; William Townson & Sons, Ltd.

Bootle.—Houses (68), various estates; borough engineer.

Boston.—High school for girls (£20,000), for Holland E.C.; director of education, Spalding.

Buckinghamshire.—Senior school, Slough (£18,722), for the County E.C.; director of education, Aylesbury.

Callander.—Houses for the T.C.; E. Simpson, McMichael and Davidson, architects, 16, King Street, Stirling.

Caterham.—Houses (195), Markfield Gardens Estate; F. W. Thomas.

Chelmsford.—Elementary school, Lady Lane, for the E.C. Alterations to Ship Hotel, Broomfield Road; Ridley & Sons.

Chesterton.—Houses (40), for the R.D.C.; James Brignell, builder.

Coventry.—Reconstruction of business premises, Hertford Street, for J. R. Holbrook & Co. (£7,000).

Croydon.—Flats, Warham Road; Hooker & Rogers, architects and surveyors, 4, High Street. Shops and flats, Denning Avenue; Bovis, Ltd., builders, Upper Berkeley Street, W.1.

Cumberland.—School, Silloth, for the C.C.; J. Forster, architect, Carlisle.

Denny (STIRLINGSHIRE).—Hostel and houses (24); borough surveyor.

Doncaster.—Premises, Warmsworth Road, for the Co-operative Society; T. H. Johnson, architect, 20, Priory Place. Rebuilding Palace Cinema, Silver Street (£60,000); Chadwick, Watson & Co., architects, Crown Chambers, 9, Albion Street, Leeds.

Dukinfield.—Reconstruction of Palladium Picture Palace, Crescent Road; Lindley & Gibson, architects, 4, Market Avenue, Ashton-under-Lyne.

Durham Co.—School, Easington; F. Willey, architect, 34, Old Elvet, Durham.

Edinburgh.—Block of buildings at Gogarburn Institution, for District Board of Control; S. Kaye, architect.

Ellesmere (SALOP).—Houses (28), for the R.D.C.; R. Matthews, architect, Westminster Chambers, Nantwich.

Erith.—Extensions, Northumberland Heath Schools (£6,226); director of education.

Falkirk.—Houses (218); borough surveyor.

Feltham (MIDDLESEX).—R.C. schools; Rev. W. J. Wood, rector of St. Lawrence.

Fife.—Houses (120), for C.C.; master of works, County Buildings, Cupar.

Friern Barnet.—Houses, Sweets Nurseries Estate; H. A. Nash. Houses (21), Buckingham Avenue; C. F. Day, Ltd.

Gloucestershire.—Remodelling, Stow-on-the-Wold Institution; county architect, Gloucester.

Guildford.—Cathedral (£200,000); Edward Maufe, architect, St. James's Street, London. Development, Poyle Estate, Pewley Hill; Poyle Charity Trustees. Houses (88), Shepherds Farm; Workmen's Housing Association, Ltd., Industrial House, Tavistock Road, Croydon.

Halifax.—Houses (28); borough surveyor.

Hampshire.—Six children's homes; A. L. Roberts, county architect, The Castle, Winchester. Senior school, Hedge End, for the County E.C.; David Fry, builder, Godalming. Additions and alterations to boys' school, Sholing Woolston; A. Jukes & Son, builders, Payne's Road, Southampton.

Harrow Weald (MIDDLESEX).—Secondary school, Brooks Hill (£46,125); W. S. Try, Uxbridge.

Hastings.—Extensions, High School for Girls (£3,000); director of education. Municipal aerodrome for the T.C.

Henstead (NORFOLK).—Houses (52); R.D.C. surveyor, Swainsthorpe.

Hertfordshire.—Schools, Ely (£14,000), and Liverpool Orphanage, Wavertree (£50,000), for the County E.C.

High Wycombe.—Houses (50), Herbert Road, for High Wycombe & District Housing Society, Ltd. Licensed premises, for H. & G. Simonds, Ltd., Reading.

Horncastle (LINCS).—Houses (30); R.D.C. surveyor.

Huddersfield.—Extensions to the Royal Infirmary (£80,000).

Keighley.—Offices, Goulbourne Mills, for Thorpe, Johnson & Co., Ltd.; Haggas & Sons, architects, 71, North Street, Keighley.

Lampeter (CARD).—Post office, College Street, for H.M. Office of Works, King Charles Street, S.W.1.

Lanarkshire.—Reconstruction, Victoria Primary School, Airdrie; J. Stewart, 20, Albert Street, Motherwell.

Lancashire.—Library, Horwich (£3,300); director of education, Preston.

Lancaster.—Houses (100), Corporation estate; Nicholson and Wright, Ltd., contractors, Lancaster.

Lincoln.—Alterations to Duke of Wellington Hotel, Broadgate; Traylen & Lenton, architects, 10, Broad Street, Stamford.

Lincolnshire.—Electric lighting installation, Assize Court, Lincoln; Col. E. Larken, clerk, The Castle.

London.—(ILFORD).—Fairlop school; L. E. J. Reynolds, education architect, Town Hall. (LEYTON).—Library and electricity showrooms (£52,500), for the T.C.; J. A. Dartnall, architect. (POPLAR).—Factory, 19, Saxon Road; H. V. Perry. Erection of the George public house, 114, Glengall Road; H. C. Horswill, 182, Green Street, E.7. (PECKHAM).—Health clinic (£35,000); Peckham Health Centre, Ltd.

Maidstone.—Houses (44), for the T.C.; H. Goodsell, builder.

Manchester.—Elementary school (940 places), Wythenshawe Estate; director of education, Education Offices, Deansgate. Enlargement of Green End School, and buildings at mental colony (£40,000), Shenley; county architect.

Mansfield.—Estate development off Sutton Road; Intake Freehold Land Society. Alterations and additions to factory, Newgate Lane; Foister, Clay & Ward. Houses (100), Ravensdale Estate; borough engineer.

Mildenhall (SUFFOLK).—Houses (46), for the R.D.C.; W. Hayward, builder.

New Ferry.—Swimming baths (£12,000), for the T.C.

New Malden.—St. James's Church (£11,600); Joseph Dorey and Co., Ltd., builders, Brentford.

Newton (LANCS).—Houses (100), for the U.D.C.; F. Warburton and Son, builders, Warrington.

Oldham.—Extensions to wards at the Rochdale Road Institution; C. T. Taylor, Roberts & Bowman, architects, 10, Clegg Street.

Orrell (WIGAN).—Houses (90), Park Road site, for the U.D.C.; P. Pigot, clerk.

Paisley.—Alterations and additions to factory for W. Wotherspoon, Ltd., Glenfield Starch Works; the manager.

Penarth.—Laundry block at the hospital; Llandough; E. R. & P. L. Jeans, builders, 340, Newport Road, Cardiff.

Pinner (MIDDLESEX).—Estate development, off Marsh Road; A. B. Cutler, Estate Office, Station Road, North Harrow.

Plymouth.—Reconstruction of various schools (£23,750); borough architect.

Pontefract.—Houses (100), Wakefield Road housing scheme; Tennant & Smith, architects, Ropergate. Extensions to infirmary (£45,000).

Reigate.—School, South Park, for the E.C.; V. Hooper, architect, Station Approach, Redhill.

Renfrew.—Alterations and additions to works for Babcock & Wilcox, Ltd.; the manager.

Renfrewshire.—School at Netherlee; J. C. Fraser, county clerk, County Buildings, Paisley.

Romford.—Houses, Rush Green Road; U.D.C. surveyor.

Rotherham.—Houses (200); borough engineer.

St. Albans.—Houses (156), Camp District, for E. Stevens, The Lodge, Townsend Drive.

St. Helens (STIRLINGSHIRE).—Church, High Bonnybridge (£6,500); the minister.

Sefton.—Rebuilding the Cabbage Inn, Moss Lane (£6,000); Medcalf & Medcalf, architects, 3, Stanley Street, Liverpool.

Sevenoaks.—Block of 36 flats; U.D.C. surveyor.

Sheffield.—Junior school, Woolley Wood, Low Shiregreen; W. G. Davies, architect, Town Hall, Sheffield.

Shipley.—Houses (50), Wrose Road and Westfield Lane; Claremont Land Development Co., Ltd.

Shoreham (SUSSEX).—Houses (50); U.D.C. surveyor.

Sidcup.—Extensions to the King's Hall Cinema.

Slough.—Houses (608); U.D.C. surveyor.

Southend-on-Sea.—Greyhound racing track and speedway, Prittlewell, for Southend Stadium Co., Ltd., 381-399, Salisbury House, London.

Southgate.—Baths, Bowes Road (£17,750); U.D.C. surveyor. Houses (36), Elmscott Gardens; G. W. Newman. Telephone exchange, Green Lane; H.M. Office of Works. Estate development, Bush Hill Road; Mr. Curnew. Catholic church, Bowes Road; A. Crush.

Southport.—Estate development, Bakers Lane; Hesketh Estates (Southport), Ltd. Estate development, Windy Harbour; Ince Blundell Estates, Birkdale. Junior school (£21,000) for the E.C.; Mr. Barnish, architect.

Southwick (SUNDERLAND).—Remodelling the High Southwick Council Schools; O. T. Mark, architect, Town Hall.

Staines.—Small holdings, Yeoveney Manor (£7,329); E. Cotton, Ltd., Iver Heath, Bucks.

Stocksfield-on-Tyne.—Dairy; C.W.S. Building Department, West Blandford Street, Newcastle.

Stratford-on-Avon.—Houses (20), Wellesbourne and Long Marsh; G. E. Boshier, architect to R.D.C., High Street.

Stroud (GLOS).—Houses (32); R.D.C. surveyor.

Surrey.—Extensions, Reigate Institution (£137,760), for the P.A.C.; clerk, Kingston-on-Thames.

Sussex.—Administrative centre (£97,000) for the C.C.; H. Vincent Harris, architect. Extensions, Horsham Institution (£15,000), and casual wards, Chichester, for the P.A.C.; clerk, Chichester. School, Hailsham, for the County E.C.; director of education, Lewes.

Swadlincote.—Houses (32) for the U.D.C.; Harris Bros., builders.

Swansea.—Baptist Church, Townhill, Mount Pleasant; secretary, 67, Pantycelyn Road, Town Hill.

Tamworth.—Extensions, including operating theatre (£4,500), at hospital; T. & E. Linford, builders, Cannock.

Taunton.—Houses (50), Lyngford site; I. F. Shellard, borough engineer.

Tunbridge Wells.—Premises, High Street, Cranbrook, for the Ashford Co-operative Society, Ltd., 24, High Street, Ashford.

Tynemouth.—Houses (38), Kennels Farm Estate; W. Stockdale, architect.

Walsall.—Extensions, isolation hospital, Goscote (£14,000); borough surveyor.

Wapping.—School (180 places); St. Peter's churchwardens, London Docks.

Watford.—Houses (150), Leavensden Green; borough surveyor.

Warrington.—School, Bewsey area (150 places); Wright & Hamlyn, architects, Winmarleigh Street.

West Lancashire.—Houses (100); R. Rosbotham, R.D.C. surveyor, Ormskirk.

West Riding.—School, Harrogate; N. Wormald, architect, County Hall, Wakefield.

Widnes.—Houses (138), Lockett Road Estate; borough engineer, Town Hall.

Winchester.—Children's wards, Royal Hants Hospital; Cancellor & Sawyer, architects, Queen Anne Chambers, High Street.